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FOSTIS, CFTRI,
Mysore 570 013,
Karnataka, India.

FOOD TECHNOLOGY ABSTRACTS

Vol. 28 No. 10
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National Information Centre For Food Science And Technology
Central Food Technological Research Institute,
Mysore - 570 013, India

Compiled and Edited by

B. Vasu

C. S. Anita

Geetha Seetharam

Abstractors to FTA

AA	Author's Abstract
BV	B. Vasu
CSA	C. S. Anita
GS	Geetha Seetharam
KAR	K. A. Ranganath
SD	S. Dhanaraj
SRA	S. R. Ananthnarayan
VKR	V. Krishnaswamy Rao

Computerisation and Database Creation

P. Manilal

C. S. Anita

B. Vasu

S. R. Ananthnarayan

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ABBREVIATIONS

A	ampere
AAS	atomic absorption spectrometry
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
°C	degree centigrade
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetraaceti acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gr	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short tim
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcalk, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [$kg\ m/s^2$]
N.	North, Northern, etc
N	Normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	Poise
p	probability
Pa	pascal (N/M^2)
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro–[as in g, μm]
%	per.centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

ABBREVIATIONS FOR LANGUAGES

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	Es
Swedish	Sv

GENERAL

2016

Bhullar (AS) and Sohrab. **Quality challenge for India - need for a national focus.** *ISI Bulletin* 7(6): 1993; 176-177, 186

Covers global developments highlighting the lack of a national focus and proposals to rectify the same. SRA

2017

Dou (J), Toma (S) and Nakai (S). **Random-centroid optimization for food formulation.** *Food Research International* 26(1): 1993; 27-37

Random-centroid optimization was modified by introducing a penalty function to accommodate constraints in formula optimization. Quality parameters not significantly different ($P > 0.05$) from those obtained by the Complex (constrained simplex) modified for formulation (Forplex) were computed by this new program and yielded similar ingredient compositions to those computed by Forplex. The new program was similar or more efficient in optimization than Forplex which occasionally stalled during searching for the optimum. It has been found that the new, multifactor program written to accommodate up to 20 factors is appropriate for use in research and development, especially for formulations with constraints, while Forplex is recommended for routine formulation. AA

FOOD PROCESSING

2018

Lelieveld (HLM), Hugelshofer (W), Jepson (PC), Lalande (M), Mostert (MA), Nassaur (J), Ringstrom (R). **Microbiologically safe continuous pasteurization of liquid foods.** *Trends in Food Science and Technology* 3(11): 1992: 303-307

Summarises the guidelines prepared by the European Hygienic Equipment design groups to minimize the risk and guideline, for producing microbiologically safe continuous pasteurization of liquid foods. GS

2019

Kuchroo (TK). **Food extrusion technology.** *Beverage and Food World* 19(5): 1992: 46

2020

Defence Food Research Laboratory Mysore. **Symposium on Preservation and Supply of Fresh and Processed Foods. Mysore.17th - 18th October 1984, Defence Food Research Laboratory, DRDO, Mysore.** 1-94; 1984

Covers the abstracts of papers presented at the symposium: microbiological problems of storage and supply of fresh and processed foods by Sreenivasa Murthy, V. (pp. 55, 57); Nutritive value and shelf-life of cereal grains stored in different storage structures by Devadas, R. P., Usha Chandrasekhar, and Sakthivelmani, A. (pp. 59); Microbiological aspects of food preservation of fresh and processed foods by Adinarayanaiah, C. L. and Mathew, T. V. (pp. 59, 61); Scientific basis for considerations on food safety - realities and myths by Krishnaswamy, P. R. (pp. 65); Food safety: regulatory aspects by Kapur, O. P. (pp. 65, 67); Quality control in meat processing by Ambadkar, P. M. (pp. 67, 69); Safety plastics used in food packaging: and overview by Srivastava, R. K. and Kulshreshtha, H. K. (pp. 69, 71); Aseptic processing of fruit pulps and juices by Gupta, T. R. and Ramanathan, P. K. (pp. 75); Nutrient losses in processed, preserved and packaged foods by Vijayaraghavan, P. K. (pp. 77). CSA

FOOD PACKAGING

2021

Anon. **Packaging - catching up with world standards.** *Beverage and Food World* 19(5): 1992: 62-63

Packaging materials

2022

Urzendowski (IR) and Pechak (DG). **Characterization of food packaging materials by microscopic, spectrophotometric, thermal and dynamic mechanical analysis.** *Food Structure* 11(4): 1992; 301-314

The compatibility of polyethylene/polypropylene blends was identified by using glassy state relaxations, secondary transitions, heats of fusion, tan δ data and storage modulus data. From the permeability, thermal and microscopic data, saran coated high impact polystyrene cups were found unsuitable for oil based products due to environmental stresses induced in the polystyrene layer. SD

2023

Figge (K) and Hilpert (HA). **Migration of various additives out of polymeric packing material into**

test fat HB 307 at different combinations of test conditions '2h/70°C' and '10d/40°C'. *Deutsche Lebensmittel-Rundschau* 88(1): 1992: 10-13 (De)

FOOD ENGINEERING AND EQUIPMENT

2024

Awuah (GB), Ramaswamy (HS) and Simpson (BK). **Surface heat transfer coefficients associated with heating of food particles in CMC solutions.** *Journal of Food Process Engineering* 16(1): 1993: 39-57

Successful temperature prediction for particular foods in viscous fluids (0-1% CMC sol.) requires data on the convective heat transfer coeff. (hfp) at the fluid particle interface. Av. hfp values ranged from 80-450 w/m^2C for potatoes and 100-550 w/m^2Cfor carrots. Natural convection dominated the flow regime, giving good correlations between Nusselt and Rayleigh numbers. RN

2025

Peleg (M). **Assessment of a semi-empirical four parameter general model for sigmoid moisture sorption isotherms.** *Journal of Food Process Engineering* 6(1): 1993: 21-37

2026

Zhang (Q) and Litchfield (JB). **Fuzzy logic control for a continuous crossflow grain dryer.** *Journal of Food Process Engineering* 16(1): 1993: 59-77

2027

Moreira (RG) and Bakker-Arkema (FW). **Grain dryer controls: A review.** *Cereal Chemistry* 69(4): 1992: 390-396

The technology of in-bin and continuous-flow grain dryer controllers was assessed. In-bin controls are usually of the heuristic type. Control for continuous-flow grain dryers is of either the classical feedback or the adaptive feedforward type. Moisture-based control is recommended for large variations in moisture content. Several commercial controllers were evaluated. It was concluded that controllers have finite grain-quality and cost advantages when installed on in-bin and continuous-flow systems. AA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

2028

Hwang (J), Pyun (YR) and Kokini (JL). **Side chains of pectins: Some thoughts on their role in plant cell walls and foods.** *Food Hydrocolloids* 7(1): 1993: 39-53

This article reviews the characteristics of side chains of pectins in the plant cell walls and their contribution to functional properties in food systems with particular reference to gelling and rheologcial properties. Also the possible implications brought about by structural and topological knowledge of side chains in the plant cell walls are discussed for enzymatic extraction of pectins. 96 references. SD

2029

Mabon (TJ). **Colour measurement of food.** *Cereal Foods World* 38(1): 1993: 21-25

The objective of this article is to discuss optical characteristics of food products, pitfalls of subjective evaluations of colour, colour scales and indices used in the food industry, instrument technology and sensor geometry, and methods of colour measurement. CSA

2030

Shankaranand (VS) and Lonsane (BK). **Potential and economic avenue to efficiently meet the demand of citric acid by food and beverage industries.** *Beverage and Food World* 19(5): 1992: 31-34, 36

2031

Deighton (N), Glidewell (SM), Goodman (BA) and Morrison (IM). **Electron paramagnetic resonance of γ-irradiated cellulose and lignocellulosic material.** *International Journal of Food Science and Technology* 28(1): 1993: 45-55

Results of the investigation of the Electron Paramagnetic Resonance (EPR) spectra of γ-irradiated celluloses and of the products from a lignocellulosic material (oat straw) subjected to various chemical treatments is presented. The chemical treatments of cellulosic material involving strong alkali (greater than or equal to 15% in the present measurements) during purification result in subtle structural alterations. GS

2032

Pinnioja (S), Autio (T), Niemi (E) and Pensala (O). **Import control of irradiated foods by the thermoluminescence method.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(2): 1993: 111-115

A thermoluminescence (TL) method was applied for the import control of irradiated foods. The method is based on the detn. of the TL of mineral contaminants in foods. Detection of irradiation was incorporated in official Finnish control procedures in spring 1990. For foodstuffs with a reduced microbe content and in which no fumigant residues are found, possible irradiation is investigated by the TL method. The minerals are separated from the foods in different ways: picking is used for spices; water rinsing for herbs, spices, berries and mushrooms; high-density liquid to separate the organic material from the mineral fraction in seafood; and carbon tetrachloride for foods forming gels with water. To date about 140 food samples have been analysed for control purposes; 50 samples of herbs and spices, 25 samples of berries and mushrooms and 65 samples of seafood. Of these, 14 samples of herbs and spices and 5 samples of seafood were shown to have been irradiated. Differences in TL intensity between irradiated and unirradiated samples were at least 1 and usually 3-4 orders of magnitude. AA

2033

Choudhury (S), Boruah (M) and Goswami (TD). **Estimation of uranium in some edible and commercial plants.** *Defence Science Journal* 42(4): 1992: 241-243

The av. uranium content in some edible (cereals, pulses, vegetables, leafy vegetables and fruit vegetables) and commercial plants (betel leaves, tobacco leaves, arecanuts and lime) vary from 0.25 to 2.67 p.p.m. BV

2034

Bouraoui (M), Richard (P) and Fichtali (J). **A review of moisture content determination in foods using microwave oven drying.** *Food Research International* 26(1): 1993: 49-57

This paper reviews the use of microwave drying for food moisture content detn. Successful approaches for a var. of food products were summarized and their findings discussed. Results were compared with conventional techniques. Generally, the magnitude of error was small. Several parameters that affect measurement accuracy were discussed. These included among others, drying time, microwave power, sample mass and composition, and container size, geometry and location in the oven. AA

2035

Xu (P), Price (J) and Aggett (PJ). **Recent advances in methodology for analysis of phytate and inositol phosphates in foods.** *Progress in Food and Nutrition Science* 16(3): 1992: 245-262

Summarises the methods available for the analysis of phytate and structurally related molecules, i.e. inositol polyphosphates. Methods reviewed for the detn. of phytate (inositol hexakisphosphate) are: colorimetric methods, conventional anion exchange column chromatography, NIR reflectance spectroscopy and phosphorus-31 Fourier transform NMR spectroscopy. Methods covered for analysis of phytate and lower inositol phosphates are: low pressure anion exchange column chromatography and HPLC. Other methods discussed for the quantitation of inositol phospahtes separated by HPLC include: on-line post column reaction and detection and off-line detection methods. 83 references. BV

FOOD MICROBIOLOGY AND HYGIENE

2036

Bhabha Atomic Research Centre (Bombay). **DAE Symposium on Advances in Molecular Biology.15th-17th January, 1990. Bhabha Atomic Research Centre, Bombay.** v+531: 1990

This symposium covers articles on structural analysis of glutenin storage protein in rice by Yogesh R. Mawal, Vidya Gupta and Ranjekar, P. K. (pp. 340-347, 5 refs); Protein phosphorylation in *Brassica juncea* and *Oryza sativa* under salt stress by Anjali S. Gujar and Pranab Roy (pp. 348-357, 20 refs); Characteristics of some biochemical mutants of grain pea *Pisum sativum* by Sushil Kumar (pp. 358-366, 4 refs); De novo synthesis of orthodiphenol oxidoreductase in potato: Regulation by Bhat, S. G. et al (pp. 398-404, 16 refs); and Isozyme changes associated with salt tolerance in Callus tissues of rice by Narayanan, K. K. (pp. 410). CSA

Enzymes

2037

Torronen (A), Leisola (M) and Haarasilta (S). **Inhibition of rye α-amylase activity by α-amylase inhibitor.** *Cereal Chemistry* 69(4): 1992: 355-358

Endogenous α-amylase inhibitors from barley, wheat, soy and rye were found to inhibit rye

α-amylase. The inhibitor from barley was studied in detail. This proteinaceous molecule was stable at alkaline pH range and most active when the pH was over 7.0. The rye α-amylase-inhibitor complex was not heat stable, but bovine serum albumin stabilized the complex. The falling number and amylograph tests showed that the inhibitor could be considered a potential-α-amylase inhibitor in breadmaking when flour made of sprout-damaged rye is used. AA

Microorganisms

2038

Eckner (KF). **Bacteriocins and food applications.** *Dairy, Food and Environmental Sanitation* 12(4): 1992: 204-209

The potential use of bacteriocins in food industry has spured research and provided an effective means of ensuring food safety by inhibiting foodborne pathogens, by aiding in the preservation of foods, by controlling fermentations, and by preventing or reducing food spoilage while extending the shelf-life and stability of the product with regard to microbial activity. Aspects considered are: the nomenclature for bacteriocins, protein/structures, mode of action, production, gene encoding, bacteriocin-producing strains, (*Lactobacillus, Listeria, Micrococcus, Staphylococcus, Streptococcus, Pediococcus, Clostridium, Comynebacterium, Mycobacterium, Sarcina, Streptomyces*), food safety, preservation and spoilage (meats, fish, dairy products, cereals, fruits and vegetables, beverages), shelf-life vs refrigerated products, future uses and potential. 65 references. SRA

Bacteria

2039

Baranyi (J), Roberts (TA) and McClure (P). **A non-autonomous differential equation to model bacterial growth.** *Food Microbiology* 10(1): 1993: 43-59

In order to describe the dynamics of growing bacterial cultures a non-autonomous differential equation is applied. The model describes the lag phase as an adjustment period and for the lag-parameter a new definition is introduced. Some mathematical aspects of the model are described and, on the basis of more than 500 growth curves, its statistical properties are compared with the Gompertz-approach commonly used in food microbiology. AA

2040

Payne (MJ), Campbell (S) and Kroll (RG). **Lectin-magnetic separation can enhance methods for the detection of *Staphylococcus aureus*, *Salmonella enteritidis* and *Listeria monocytogenes*.** *Food Microbiology* 10(1): 1993: 75-83

The ability of lectins from *Triticum vulgaris* and *Agaricus bisporus*, immobilized on magnetic microspheres, to enhance the sensitivity of conventional plating methods of detection of *Salmonella enteritidis*, *Listeria monocytogenes* and *Staphylococcus aureus* from enrichment cultures of inoculated raw egg, ground beef, braising steak or Camembert cheese was investigated. With some lectin/organism/food combinations, the immobilized lectins were effective at separating the organisms but no, or little, enhancement of sensitivity of detection was observed. This should, however, provide 'cleaner' microbiological samples which could enhance the sensitivity of some rapid microbiological methods. However, the sensitivity of detection of *S. enteritidis* in beef samples by conventional plating methods was enhanced by 2 orders of magnitude and *Staph. aureus* (at low cell densities) by one order or magnitude. AA

2041

Okiyama (A), Shirae (H), Kano (H) and Yamanaka (S). **Bacterial cellulose I. Two-stage fermentation process for cellulose production by *Acetobacter aceti*.** *Food Hydrocolloids* 6(5): 1992: 471-477

Production of cellulose by *Acetobacter aceti* AJ12368 was optimized in a two-stage fermentation process. A cell growth stage in an air-lift fermenter (agitated culture) was followed by a cellulose formation stage in production incubators (static culture). The optimal moment of process change was at day 3 of agitated culture when the cell density and intracellular Adenosine triphosphate content peaked; at this time culture broth in the air-lift fermenter could be subdivided to feed four production incubators equipped with 9 trays. Surface aeration was effective in producing food-use gelatinous cellulose which is homogeneous and low in syneresis. This process was more economical than the conventional fermentation procedure in the Nata industry. AA

2042

Okiyama (A), Motoki (M) and Yamanaka (S). **Bacterial cellulose. II. Processing of the gelatinous cellulose for food materials.** *Food Hydrocolloids* 6(5): 1992: 479-487

Gelatinous cellulose prepared by fermentation with *Acetobacter aceti* AJ 12368 consisted of cellulose fibrils (0.9%), bound water (0.3%) and free water (98.8%). The cellulose network absorbed water weakly in capillaries of about 0.5 - 1.0 microns.

When stressed the gel released its water and deformed without fracture. The gel by itself was too tough to bite, but it became edible through processing either with sugar alcohol or with alginate and calcium chloride. The textures resemble fruit, such as grapes and molluscs such as squids, respectively. The mechanism is the immobilization of the water of gelatinous cellulose by viscous or gel-forming material, and accordingly the gel becomes easy to cut off with the teeth. The results show that gelatinous cellulose with its fibrous texture can be a new material for salads, low-calorie desserts, fabricated foods etc. AA

Blue-green algae

2043

Hori (K), Ueno-Mohri (T) and Okita (T). **Absorption of colour additives and settling volume in water of blue-green alga, ishikurage (*Nostoc commune*).** *Plant Foods for Human Nutrition* 42(1): 1992: 31-36

The properties of ishikurage (*Nostoc commune*) and other algae were compared. Ishikurage and suizenji nori (*Aphanothece sacrum*) absorbed much more amaranth than others. They have a high settling vol. (SV) in water. The high of SV of ishikurage is attributable to its neutral detergent fiber (NDF). The acid detergent fiber (ADF) from the alga had a high amaranth absorption. However the absorption by the ADF did not explain the absorption by ishikurage. The results suggest that ishikurage may have a nutritional significance as a source of dietary fiber. AA

Escherichia coli

2044

Buchanan (RL) and Klawitter (LA). **The effect of incubation temperature, initial pH, and sodium chloride on the growth kinetics of *Escherichia coli* 0157:H7.** *Food Microbiology* 9(3): 1992: 185-196

A total of 184 aerobic and 144 anaerobic cultures were generated, representing 75 and 70 variable combinations, respectively. Comparison of lag phase durations (LPDs), generation times (GTs) and estimated time to achieve a three log cycle increase in population density (10^2 - 10^2) cfu ml^{-1}) suggested that aerobic conditions tended to enhance growth. The max. population densities (MPDS) achieved by the cultures were largely independent of the three variables (incubation temp. initial pH and NaCl level); however, there was a general depression of MPDs by 0.5-1.0 log cycles when the cultures were incubated anaerobically. Under optimal conditions, GTs and LPDs were largely unaffected by initial pH values greater than or equal to 5.5. The growth rate of the organisms decreased with increasing NaCl level, with the effect being greater in the other variables were also non-optimal. Comparison of the present data with previous reports suggest that the growth kinetics of *E. coli* 0157:H7 are similar to those for non-pathogenic strains. SRA

Yersinia

2045

Greenwood (MH). **Comparison of enrichment at 9°C and 21°C for recovery of *Yersinia* species from food and milk.** *Food Microbiology* 10(1): 1993: 23-30

The recovery of *Yersinia* sp. from food and milk samples enriched in tris-buffered 1% peptone water pH 8.0 incubated at 9°C was compared with recovery after incubation at 21°C. The recovery rates for the 2 temp. were similar except for pasteurized milk samples, for which significantly better recovery was obtained at 9°C. To obtain parity of recovery, incubation at 21°C required subculture after 4-7 days and 11-14 days; extending the period of incubation beyond 6 or 7 days resulted in an increased recovery of 26%. Under these conditions, incubation at 21°C is a suitable alternative to incubation at 9°C isolation of *Yersinia* spp. from food samples but not from pasteurized milk. AA

Fungi

Aspergillus flavus

2046

Ellis (WO), Smith (JP), Simpson (BK), Khanizadeh (S) and Oldham (JH). **Control of growth and aflatoxin production of *Aspergillus flavus* under modified atmosphere packaging (MAP) conditions.** *Food Microbiology* 10(1): 1993: 9-21

The combined effect of a_w, pH, storage temp. and initial headspace O_2/CO_2 concn. on the growth of and aflatoxin production by *Asp. flavus* in malt extract agar (MEA) plates packaged in a high gas barrier film after 15 days was studied. Results showed that mold growth was either completely inhibited or was visible after 1-2 days. Generally growth was more extensive in plates packaged in 10-20% O_2 (54 - 48%) CO_2) and stored at 25 - 35°C. Growth of *Asp. flavus* was inhibited when stored at 15 - 20°C irrespective of the gas atm. Aflatoxin production was max. at a colony diam. of 7 mm and then decreased with increasing colony diam. In all cases where growth occurred, the level of aflatoxin was < the current regulatory standard of 20 ngg^{-1}. Study showed that *A. flavus* can grow in a CO_2 enriched atm. if headspace oxygen is present. SRA

Mushrooms

2047

Bhattacharyya (PR), Adhikary (RK) and Bordoloi (DN). **Population dynamics of insect pests and damage of the white button mushroom in the environment of North Eastern India.** *Journal of Food Science and Technology (India)* 30(5): 1993: 377-379

Insects belonging to order viz., Diptera, Hymenoptera, Coleoptera, Collembola and Homoptera were found attacking white button mushrooms (WBM) during cropping season of 1990-91. Mean total population showed a relationship with temp. fluctuation during the period. Diptera accounted for the highest population (18.5 plus or minus 0.53/trap/day, 94.9% of the total population). Highest overall population among the Dipterans was in the order of phoridae (8.58 plus or minus 0.31) followed by Sciaridae (5.58 plus or minus 0.26) and Cecidomydae (4.56 plus or minus 0.23). Population fluctuation varied in different months. Crop yield was considerably affected (49%) by insect pests. SD

2048

Khanna (PK), Bhandari (R), Soni (GL), Singh (CK), Garcha (HS), Mittar (D). **Role of mushroom (*Pleurotus florida*) as hypocholesterolemic/hypolipidemic agent.** *Indian Journal of Experimental Biology* 31(6): 1993: 567-568

Male albino rats of group A (control) were fed on hypercholesterolemic diet containing 64% starch, 10% groundnut oil, 15% casein protein, 4% salt mixture, 1% yeast powder, 5% cellulose and 1% cholesterol, and group B and°C on hypercholesterolemic diet containing 5 or 10% dried mushroom (*P. florida*) for 4 wk. Results showed that the inclusion of mushroom at 5 or 10% level in the diet increased the food intake (363.3 plus or minus 18.50 and 393.3 plus or minus 3.3) significantly as compared to control (212.6 plus or minus 6.4) without any significant effect on gain in body wt. but lowering food efficiency ratio. Ccholesterol and glyceride levels in plasma were significantly decreased as reflected in both high density lipoprotein and very low density lipoprotein fractions. Inclusion of mushroom in diet did not show any untoward reaction at the cellular level as evidenced by similar lipid peroxidation and histopathological abberations of various tissues compared to those in control groups. SRA

2049

Lopez-Briones (G), Varoquaux (P), Bureau (G) and Pascat (B). **Modified atmosphere packaging of common mushroom.** *International Journal of Food Science and Technology* 28(1): 1993: 57-68

Four microporous films in oriented plypropylene (OPP) and a film used to overwrap mushroom punnets (stretchable PVC) were tested for packaging mushrooms, which have a high respiration rate. Mushroom punnets placed into pouches were stored at 4 and 10^0C for 8 days and the effects of modified atm. packaging (MAP) on the quality (whiteness, texture, stage of maturity and microbial contamination) of mushrooms was studied. The optimum atm. should contain 2.5 - 5% CO_2 and 5-10% O_2. A highly permeable film such as 30 PB 260 (200 000 ml O_2 or $CO_2 m^{-2}$ day atm.) resulted in a contamination of 10^7 CFUg^{-1}. GS

Yeasts

2050

Samoon (AH). **Role of yeasts in fermentation and spoilage of foods and beverages.** *Beverage and Food World* 19(5): 1992: 56-58

Yeasts play an important role in fermentation of various food and beverages. Several yeasts are increasingly used commercially in food and beverages fermentation industry now-a-days. However, some species of yeasts may also be associated with development of off-flavours, abnormal colours and spoilage in foods and beverages. Various commercially, important species of yeasts have been classified and their vital behavioural characteristics in relation to food substrates have been discussed here in detail. Methods employed for identification and characterization of commercially important yeasts in foods and beverages have also been discussed. AA

2051

Yamani (MI). **Yoghurt whey medium for food-borne yeasts.** *International Journal of Food Science and Technology* 28(1): 1993: 111-116

A selective medium based on yoghurt whey was developed for the enumeration of yeasts in foods. Yoghurt whey agar (YWA) was prepared by mixing one part of a sterile agar sol. (5%) with two parts of a sterile whey filtrate obtained from autoclaved (121°C, 20 min) plain set yoghurt. The performance of YWA in the enumeration of yeasts was compared with that of plate count agar plus antibiotics (APCA) and acidified potato dextrose agar (PDA-A) by examining food samples and broth cultures of known yeast isolates. APCA ranked first, confirming the superiority of antibiotic amended media over the acidified ones. The overall performance of YWA was comparable to that of PDA-A. AA

BIOTECHNOLOGY

2052
McEvoy (TG), Robinson (JJ) and Sreenan (JM). **A role for transgenic animals in food production.** *Trends in Food Science and Technology* 3(11): 1992: 294-302

This review examines the possibilities of applying gene transfer technology in food production and quality control; its acceptability and its relevance to producers and consumers of food produced from mammals, birds and fish. Aspects highlighted are direct roles for transgenic animals (growth, reproduction, milk production) and indirect roles for transgenic animals (disease control digestion). 66 references. GS

2053
Department of Food Technology and Biochemcial Engineering (Calcutta). **Lowcost Biotechnological Processes for Preservation of Vegetables. Proceedings of the National Seminar. Calcutta.27th March 1987. Department of Food Technology and Biochemical Engineering, Calcutta.** 1-50; 1988

The articles presented at the proceedings include low-cost preservation of vegetables by lactic fermentation by Steinkraus, K. H. (pp. 5-11); Low-cost rural oriented technique for storage of vegetables by Susanta, K. Roy and Pal, R. K. (pp. 14-16); Improving food supplies and lowering the poverty line through biotechnology of vegetable conservation and processing by Parpia, H. A. B. (pp. 16-26); Impact and applications of biotechnology and genetic engineering to the food industry by Steinkraus, K. H. (pp. 28-32) and Promotion of fermentative method of preservation of vegetables in rural areas of West Bengal by Sunit Mukherjee and Gangopadhyay, H. (pp. 33-38). CSA

TISSUE CULTURE

Nil

FOOD ADDITIVES

Acidulants

2054
Anon. **Choice of acidulants in food processing.** *Beverage and Food World* 19(5): 1992: 60-61

Colourants

Saffron

2055
Saito (K). **A new enzymatic method for the extraction of precarthamine from dyer's saffron florets.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(1): 1993: 34-36

Precarthamine was extractable at a high yield from the floret paste of dyer's saffron, when pretreated with glucosidase in water. The hydrolysate extraction conditions, recovery rate, and identification were studied in order to establish a new enzymatic method for the preparation of precarthamine. The results are evaluated by comparison with the old procedures. AA

CEREALS

2056
Gahlawat (P) and Sehgal (S). **Phytic acid, saponins, and polyphenols in weaning foods prepared from oven-heated green gram and cereals.** *Cereal Chemistry* 69(4): 1992: 463-464

Barley

2057
Tester (RF), Morrison (WR) and Schulman (AH). **Swelling and gelatinization of cereal starches. V. Riso mutants of Bomi and Carlsberg II barley cultivars.** *Journal of Cereal Science* 17(1): 1993: 1-9

Mutations affecting protein synthesis were accompanied by changes in starch chemistry and physical properties of high lysine barley. Reduced activity of soluble starch synthase played a role in depressing the deposition of starch in granules. Swelling factors at 80°C, above the gelatinization temp. range were inversely correlated with liquid content and were within the range of normal, fully-mature barley starches. No major mutants for starch structure, such as waxy, high-amylose or amylose extender were found. Lipid content was very low in Riso 527 and very high in Riso 17. GS

2058
Tester (RF) and Morrison (WR). **Swelling and gelatinization of cereal starches. VI. Starches from waxy hector and hector barleys at four stages of grain development.** *Journal of Cereal Science* 17(1): 1993: 11-18

Lipid-complexed amylose (LAM) and lipid-free amylose (FAM) contents of waxy and non-waxy starches increased during barley grain development and starch accumulation. Changes in amylopectin (AP) structure and starch crystallinity appear to be less and variation in resistance to linterization (acid hydrolysis) in swelling at 80°C and in peak gelatinization temp. was attributed to different levels of FAM and LAM. GS

2059

Czuchajowska (Z), Szczodrak (J) and Pomeranz (Y). **Characterization and estimation of barley polysaccharides by near-infrared spectroscopy. I. Barleys, starches, and β-D-glucans.** *Cereal Chemistry* 69(4): 1992: 413-418

Large and small starch granules were isolated from regular amylose (about 25%), high-amylose (44-49%), and high-amylopectin (traces of amylose) barleys. Their near-infrared reflectance (NIR) spectra were compared with those of relatively pure (1-3), (1-4)-β-D-glucans from barley and oats and with NIR spectra of ground barleys - naked and covered, regular, high-amylose, and high-amylopectin. The objective was to obtain detailed information on NIR spectra of barleys, isolated starches, and isolated β-D-glucans to serve as a basis for development of a NIR spectroscopy method for β-glucan assay in barleys. There was little difference in NIR spectra of hull-less and covered barleys; whole meals of regular, high-amylose, and high-amylopectin barleys showed similar spectra. Small differences were recorded between spectra from high-amylose and regular or high-amylopectin starches. Spectra of starches and whole meals from which the starches were obtained differed widely. Major differences were recorded in three areas over the whole range of 1600, 2, 2,400 nm, for whole meals, isolated starches, and isolated β-glucans. They included 1) wavelengths 1,702, 1,707, 1,772 and 1,773 nm, principal bands of starches, cellulose, and hemicellulose; 2) 2,060, 2,096 and 2,132 nm, bands associated with the interaction between starch and protein; and, foremost 3) 2,268, 2,282 and 2,335 nm, bands that typify starch, β-glucans, and cellulose. AA

2060

Szczodrak (J), Czuchajowska (Z) and Pomeranz (Y). **Characterization and estimation of barley polysaccharides by near-infrared spectroscopy. II. Estimation of total β-D-glucans.** *Cereal Chemistry* 69(4): 1993: 419-423

Total β-glucans were determined in 139 barleys, 84 of which were used for calibration and 55 for validation. They included covered two- and six-rowed regular (about 25% amylose in the starch) barleys, covered and hull-less waxy (up to 100% amylopectin) and high-amylose (up to 49% amylopectin) barleys, and chemically treated and γ-irradiated barleys. Both commercial and varietal samples (from 3 locations) were used. The total β-glucan content ranged from 2.7 to 9.5% and was higher in waxy than in regular or high-amylose barleys. Equations for prediction of β-glucan content by the best fit of 3 wavelengths and the single-wavelength (2,264 or 2,348 nm) method (using the step-up program) were developed. The standard error of prediction for both was slightly above 0.6%. The 3 selected wavelengths were in the 2,260- to 2,380-nm region, previously found by us to be typical for β-glucans. In light of the highly heterogenous populations used in this study, the accuracy of predicting the β-glucan contents in the validation samples was affected by the identity of barleys used for developing the prediction equations. Preliminary studies indicated that even for more homogenous populations, the results may be affected by kernel size, hardness, and protein contents. The above parameters may have to be included in developing equations to predict the β-glucan contents of barleys. AA

Oats

2061

Marklinder (I) and Lonner (C). **Fermentation properties of intestinal strains of *Lactobacillus*, of a sour dough and of a yoghurt starter culture in an oat-based nutritive solution.** *Food Microbiology* 9(3): 1992: 197-205

The properties of the fermented oatmeal soup were shown to be influenced by the strain of *Lactobacillus* used as starter culture. The fermentation properties in the soups fermented by *L. plantarum* strains A1 (isolated from rye sour dough) and 299 (isolated from human intestine) appeared to be similar. There were similarities between *L. reuteri* strains 47 and 108 isolated from rat and human respectively. The homoferment bacteria contributed to a more tasty soup. *L. plantarum* strains 299 and A1, *L. casei* ssp. *rhamnosus* strain 271, *L. gasseri* strain 292 and *L.sp* strain 99a were found to be potential as starter cultures for fermenting oatmeal soups. SRA

2062

Ekstrand (B), Gangby (I) and Akesson (G). **Lipase activity in oats - Distribution, pH dependence, and heat inactivation.** *Cereal Chemistry* 69(4): 1992: 379-381

The lipase activity in oat kernels at different pHs, at different stages of development, and in different parts of the oat kernel was studied. The

measurement of lipase activity was performed by means of fluorescence spectrophotometry. Lipase activity was higher in the aleurone layer and embryonic tissues than it was in the starchy endosperm. This also was shown in flour samples from fractionated milling. In accordance with the lipase distribution found in the oat kernel, the lipase activity was highest in flour fractions close to the superficial bran layer and was lowest in the internal endosperm fractions. The development of lipase activity during germination of the seeds caused an increase in the activity at neutral and alkaline pH, whereas the activity at acid pH remained relatively constant. This indicated that the lipase activity at alkaline pH was more related to the metabolic processes initiated by the growth of the embryo. Three different Swedish cvs were analyzed. Lipase activity varied only slightly and was not correlated to fat content. Lipase inactivation was studied in model lab. studies. These showed the importance of good heat transport into the sample, not only high temp., in activating the enzyme. AA

Paddy

2063

Indudharaswamy (YM), Unnikrishnan (KR) and Narasimhan (KS). **Changes in free fatty acids and insect infestation during storage of brown rice obtained by shelling paddy in rubber roll and disc shellers.** *Journal of Food Science and Technology (India)* 30(5); 1993; 324-330

Brown rice obtained from IR20 paddy was stored in cloth bags and bottles at cold (4 - 6°C), room temp. (RT), 37°C, 62% RH and 37°C, 92% RH with and without insects upto 13 months. Free fatty acids (FFA) (< 3% initially) increased with storage, the increase being almost double in disc-shelled rice than in rubber roll shelled rice. High temp., RH and cloth bag increased FFA. Insects eventhough did not survive at 37°C, 62% RH, multiplied rapidly at RT and spoiled the rice in 3 months. SD

Quinoa

2064

Ruales (J) and Nair (BM). **Nutritional quality of the protein in quinoa (*Chenopodium quinoa*, Willd) seeds.** *Plant Foods for Human Nutrition* 42(1); 1992; 1-11

The nutritional quality of protein in quinoa seeds has been determined by amino acid assay and by animal feeding experiments. The amino acid composition of the protein in raw quinoa and washed quinoa show similar pattern. The first limiting amino acids were the aromatic amino acids thyrosine + phenylalanine giving a chemical score of 86 for protein in raw quinoa and 85 for protein in washed quinoa. Threonine was the next limiting amino acid followed by lysine. The amount of lysine and sulphur amino acids (methionine + cystine) was relatively high. In general, the content of essential amino acids in quinoa is higher than in common cereals. The animal experiments showed NPU values of 75.7, BV of 82.6 and TD value of 91.7 for the protein in raw quinoa. Results of the in-vitro enzymatic methods showed that the digestibility of the protein in quinoa is comparable to that of other high quality food proteins. The corresponding experiments carried out with samples of guinoa seeds, which have been processed to remove the saponins, showed that, teh saponins do not exert any negative effect on the nutritive quality of the protein. AA

Rice

2065

Pandey (JP) and Sah (PC). **Rice kernel breakage kinetics in the process operation for bran removal.** *Journal of Food Science and Technology (India)* 30(5); 1993; 365-367

Effect of polishing time and degree of polish on breakage behaviour on 5 paddy var. Prasad, Manhar, Sita, UPR 239 and PD4 were studied. The percentage breakage increased non-lineraly with milling time but the breakage varied linearly with degree of polish. The breakage behaviour depended on paddy var. SD

2066

Chang (S-M) and Yang (H-C). **Thermal processing effects on rice characteristics.** *Food Structure* 11(4); 1992; 373-382

Whole kernals of 4 cvs of milled rice viz Koahsilling Sen 7, Taichung Sen 10, Taichung, 67 and Taichung Waxy 46 were thermally treated by boiling, steaming, autoclaving or roasting with sand and degree of gelatinization, water absorption index, water soluble index, swelling power, viscoamylograms and X-ray diffraction patterns determined. The waxy rice samples were more highly gelatinized than non-waxy samples especially in samples with optimal moisture contents and at high temp., the amylose contents of rice being the important factor. SD

Rice bran

2067

Newman (RK), Betschart (AA), Newman (CW) and Hofer (PJ). **Effect of full-fat or defatted rice bran**

on serum cholesterol. *Plant Foods for Human Nutrition* 42(1): 1992: 37-43

Rice bran has been shown to lower serum cholesterol in hamsters. Leghorn cockerel chicks were fed 60% full-fat rice bran (FFRB) and corn/soy (CS) diets with 0.5% added cholestrol. Both diets contained 18% protein. All reported parameters are on blood serum. Significant differences ($p < 0.05$) were found in total cholesterol (TC), triglycerides (TG), high-density and low-density lipoprotein cholesterol (HDL and LDL). In a second study, chicks were fed FFRB, defatted rice bran (DFRB), and CS diets balanced for 18% protein, 14.47% total dietary fiber and 10.78% lipid with 0.5% added cholesterol. Both TC and TG were significantly lower ($p < 0.05$) in chicks fed FFRB and CS diets. Significant differences were found in HDL values for all diets with FFRB exhibiting the highest mean value (155 mg/dl) and CS exhibiting the lowest mean value (114 mg/dl). All diets were significantly different ($p < 0.05$) in LDL, with mean values of 249, 318 and 275 mg/dl for FFRB, DFRB and CS, respectively. FFRB appears to increase HDL and to lower LDL in chicks, but does not always affect TC, whereas DFRB may increase all three serum lipid components. AA

Wheat

2068

Ereifej (KI) and Shibli (RA). **Quality evaluation of 'Landrace' and 'Durum' wheat cultivars grown in Jordan.** *Journal of Food Science and Technology (India)* 30(5): 1993: 339-343

Ten 'Durum' wheat cvs (including a 'Landrace', old and newly developed cvs) have been evaluated for a number of quality parameters. The 'Landrace Horani-27', had the highest protein content (14.4%), but intermediate flour yield (43.7%), 'Lacesh', gave highest flour yield (57.5%), particle size index (PSI) (19.7%), sodium dodecyl sulphate sedimentation(SDS-SED) (52 ml), but was intermediate in protein content (9.7%). The old cvs, 'Der Alla-2' and 'Der alla-6' had no clear-cut patterns for the quality parameters studied. Proximate analysis showed that these cvs were higher than av. for fibre and ash contents. It was possible to cluster these cvs into 3 groups each for flour yield, protein content, SDS-SED, PSI % and thousand kernel wt. The variability in the composition of each cluster allows for combining certain cvs to complement each other for a better balance of these quality traits. AA

2069

Singh (KSSN) and Singh (RP). **Studies on improvement of quality of wheat infected with Karnal Bunt. 1. Milling, rheological and baking properties.** *Indian Miller* 23(1): 1992: 21-29

Among the 4 treatments - washing, debranning, debranning followed by washing and lye peeling, the latter two improved the yield quality (ash content, milling value, colour grade value); increased the proteolytic activity, total polyphenois, free fatty acids and trimethylamine content, and improved dough rheological characteristics, bread quality and acceptability. SD

2070

Panozzo (JF) and McCormick (KM). **The rapid viscoanalyser as a method of testing for noodle quality in a wheat breeding programme.** *Journal of Cereal Science* 17(1): 1993: 25-32

A comparative study was made between the Rapid Visco Analyser (RVA) using wholemeal wheat flour and starch samples with the Brabender Viscoamylograph using flour or starch. Whole meal grist, flour and starch samples from wheat were tested using the RVA by heating a 3-4 g sample, suspended in distilled water to 60°C for 4 min, then increasing the temp. to 95°C and holding for 8 min and finally cooling to 50°C for 8 min. Flour and starch (50 g for flour, 35 g for starch, dry basis) were also heated at a rate of 1.5°C/min in a Brabender Viscoamylograph. The correlation between the two method was $P < 0.01$. The RVA is advantageous because of its high correlation with the traditional Japanese white salted noodles, its rapidity and organoleptic quality. GS

2071

Fouques (D), Lauriere (M) and Landry (J). **Characterization and quantification of high M_r subunits of wheat glutenin by amino acid analysis after electroblotting.** *Journal of Cereal Science* 17(1): 1993: 63-70

The amino acid compositions of the high relative mol. mass (M_r) or high mol. wt. (HMW) subunits of wheat glutenin were determined by the phenylthiocarbamyl (PTC) derivative procedure with polypeptides separated by sodium-dodecyl sulphate polyacrylamide gel electrophoresis SDS-PAGE and electroblotted onto polyvinylidene difluoride (PVDF) membranes. Four bands (three corresponding each to a single subunit and one to a mixture of two subunits) from the cv Courtot were analysed, either directly on the elctroblotted membrane or after elution of the polypeptides. As little as 10 µG of protein was suitable for a complete analysis. The compositions obtained were consistent with published data obtained either from similar biochemcial studies or from cDNA sequences when available. AA

2072

Marchylo (BA), Hatcher (DW), Kruger (JE) and Kirkland (JJ). **Reversed-phase high performance liquid chromatographic analysis of wheat proteins using a new, highly stable column.** *Cereal Chemistry* 69(4); 1992; 371-378

A new class of sterically protected monofunctional-silane bonded phase columns (C8 and CN) was evaluated to determine resolution capabilities and long-term stability in the RP-HPLC separation of wheat storage proteins. Up to 450 separations were performed using the high temp. (50°C) and low pH (<3) conditions required to resolve gliadins and glutenins. Superior resolution of these proteins was achieved with the new widepore, sterically protected columns as compared to that from conventional silica-based RP-HPLC columns. Statistical analysis of retention times and quantified peak areas also indicated improved stability and reproducibility as compared to that from conventional RP-HPLC columns. Column-to-column variability also appeared minimal. Analysis of storage proteins (gliadins or gliadins and glutenins) of different wheat varieties and high mol. wt. glutenin subunits exemplified the suitability of these columns for varietal identification and the study of quality-related wheat storage proteins. AA

2073

Lim (H), Setser (CS), Paukstelis (JV) and Sobczynska (D). **Nuclear magnetic resonance studies on wheat starch-sucrose-water interactions with increasing temperature.** *Cereal Chemistry* 69(4); 1992; 382-386

Water mobility in wheat starch-sucrose-water dispersions was observed by measuring the transverse relaxation rate (R_2) from ^{17}O nuclear magentic resonance spectra. Sucrose resulted in an increase in the R_2 or a decrease in the mobility of water and in temp. of the R_2 max. as temp. was increased from 35 to 81°C. Starch increased the R_2 by decreasing the mobility of water in the sample systems. The results indicated that a sucrose-starch interaction also contributed to the decreased water mobility. The onset temp. of starch gelatinization, as determined by differential scanning calorimetry, appeared to occur shortly after the water reached its R_2 max. AA

2074

Case (SE), Hamann (DD) and Schwartz (SJ). **Effect of starch gelatinization on physical properties of extruded wheat- and corn-based products.** *Cereal Chemistry* 69(4); 1992; 401-404

Wheat flour, wheat starch, corn meal, and corn starch were extruded in the form of a half-product using a pilot-plant model twin-screw extruder. Starch was gelatinized from 20 to 100%. The final cooked product (vegetable oil, 196°C) was tested for texture using the Kramer shear press on an Instron universal testing machine. As gelatinization increased, vol. of the puffed product increased and bulk density decreased. A min. bulk density was achieved at approx. 75% gelatinization for all products except corn meal, which had a min. density at approx. 55% gelatinization. Peak force at failure had a parabolic response to gelatinization. The same force is required for failure at high and low extents of gelatinization, although textural and physical attributes differed substantially. Gelatinization was modelled by the ratio of total energy to peak force at failure (E_t/PkF) from the Instron data, which was influenced by the combination of bulk density and deformability. AA

2075

Slaughter (DC), Norris (KH) and Hruschka (WR). **Quality and classification of hard red wheat.** *Cereal Chemistry* 69(4); 1992; 428-432

Twelve quality assessments of hard red spring and hard red winter wheat were evaluated over a 3-year period to determine which could best fulfil the intent of the U.S. Grain Standards Act of 1916 and the U.S. Grain Quality Improvement Act of 1986 in determining market class. The study indicated that of the 12 quality evaluations, protein content and kernel hardness were the best suited to be used as classification tools for differentiating hard red spring and hard red winter wheat and that other quality assessments not as well suited also were highly correlated with protein content. A classification model based on protein content and wheat hardness successfully classified 92.7% of the hard red winter wheats and 91.5% of the hard red spring wheats over the 3 years studied, when changes in growing conditions were incorporated into the model. A hardness and protein index was defined as a possible means of implementing in a single score the quality characteristics of hard wheat sample. AA

2076

Kim (SS) and Setser (CS). **Wheat starch gelatinization in the presence of polydextrose or hydrolyzed barley β-glucan.** *Cereal Chemistry* 69(4); 1992; 447-452

Polydextrose was fractionated (into fractions with degrees of polymerization [DP] of 3-4, 6-7, 12-16 and > 20) using Sephadex G-25 gel chromatography to study the effect of solute or carbohydrate size on thermal phase transistions of wheat starch. Polydextrose and its fractions that were obtained

using distilled water as an eluent were compared with 5 or 10% sol. of hydrolyzed barley β-D-glucan or sucrose at a 2:1 sol.-starch ratio. Other eluents, 0.5 M NaCl in 0.1 M phosphate buffer and 0.1 M ammonium acetate in 20% (v/v) ethanol, were evaluated. They resulted in contamination of polydextrose fractions by eluent salts or ions that caused a significant increase in starch gelatinization onset temp. The 10% sol. of DP 3-4 and 6-7 polydextrose fractions were compared to maltotriose, maltotetraose, maltohexaose, and maltoheptaose. The DP 6-7 polydextrose fractions increased the gelatinization onset temp. more than the other sugars. Fractions with DP > 20 resulted in a wide temp. range of starch gelatinization compared to those of DP 3-4, 6-7 and 12-16 fractions. Hydrolyzed β-glucan increased the starch gelatinization onset temp. more than polydextrose at the 20 and 30% levels. AA

2077

Gao (L), Ng (PKW) and Bushuk (W). **Structure of glutenin based on farinograph and electrophoretic results.** *Cereal Chemistry* 69(4): 1992: 452-455

The objective of this study was to obtain additional information on the mol. structure of glutenin in relation to its functionality in doughs during breadmaking. In this context, doughs from the flour of the Canadian hard red spring wheat cv. Katepwa were mixed in a farinograph in the absence and presence of a disulphide reducing agent, dithiothreitol (DTT). The glutenin of the control dough and of the partially reduced dough was examined by sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE) without and with reduction during electrophoretic analysis. At a low concn. of DTT (20 μmol/50 g or flour), the farinograph properties were markedly affected, but no high mol. wt. (HMW) subunits were liberated as indicated by SDS-PAGE without reduction. At higher concn. of DTT (80-3,000 μmol/50 g of flour), several types of glutenin subunit oligomers and all of the oligomer subunits (2*, 5, 7, 9 and 10) were liberated gradually with increasing DTT concn. HMW glutenin oligomers as 3 close-moving bands in SDS-PAGE, with mol. wts. higher than that of the largest HMW subunit (2*), were observed for doughs treated with the higher concn. of DTT. On the basis of their apparent mol. wts., the three bands appear to be dimers composed of subunits as follows: 2*+7, 2*+9 and 5+10. The results of this study are consistent with a "block" model of the molecular structure of glutenin. AA

MILLETS

Corn

2078

Mistry (AH), Steinberg (MP) and Eckhoff (SR). **Fractionation of high-lysine corn to produce edible by-products.** *Cereal Chemistry* 69(4): 1992: 433-435

A wet process for high-lysine corn was developed on a pilot scale with the primary objective of producing germ and soluble protein for food. Corn was steeped in lactic acid sol., and a hydraulic shear mill was used to remove whole germs. A floatation column separated the whole germ from the coarsely ground corn. Whole, clean germs were recovered in 8.52% yield. Soluble protein was recovered by conventional tabling, with yields of 6.67%. The soluble protein was high in lysine content. The germs have potential for replacing confectionery nuts. AA

2079

Knutson (CA) and Grove (MJ). **Variability of α-amylase synthesis in germinating maize.** *Cereal Chemistry* 69(4): 1992: 436-439

α-Amylases from germinating seeds of 5 maize genotypes were isolated by affinity chromatography and chromatofocusing for comparison with enzymes from cv B73, which contains 4 major groups of enzymes separable by these techniques: B-I and B-II have elution pH > 5.0; B-III has elution pH of 4.5 - 4.8; and B-IV has elution pH of 4.0 - 4.1. These 4 groups exhibit 3 specific patterns of hydrolysis on soluble starch, differing primarily in the proportion of degree of polymerization (DP) 2 and DP6 oligosaccharides produced. Enzyme groups found in other cvs were the same as those found in B73, but the amount of synthesis of the different groups varied substantially. Enzymes from each cv were evaluated for hydrolysis of soluble starch. 4 of the genotypes contained substantial amounts of enzyme fractions with an elution pH in the range of 4.3 - 4.5 but with an action pattern different from that of B-III: these fractions appeared to be unable to hydrolyze oligosaccharides smaller than DP8. AA

2080

Fannon (JE) and Bemiller (JN). **Structure of corn starch paste and granule remnants revealed by low-temperature scanning electron microscopy after cryopreparation.** *Cereal Chemistry* 69(4): 1992: 456-460

To determine any correlation between the ultrastructure of corn starch pastes and the functional properties on which their applicatic ns are based, starch pastes and granule remnants were plunge-frozen in melting nitrogen and examined by

low-temp. scanning electron microscopy. In all cases, pastes were composed of a continuous phase of bundles of molecules surrounding a discontinuous phase of swollen granule remnants commonly referred to as ghosts. Differences between starches were seen in the amount and size of the continuous phase and in the strength and appearance of the ghosts. Because ghost structure is important to starch paste properties, isolated ghosts were also examined to determine a relationship between ghost structures and functional properties of starches. The ghosts, like the pastes showed structural differences that correlated strongly with the rheological behaviour of each starch type. Low-temp. scanning electron microscopy should be useful as a rapid method for screening starch hybrids with unknown properties because the ultrastructures observed, although they may be somewhat artifactual, correlated with the functional properties of the starch. AA

2081

Antai (SP) and Nzeribe (E). **Suitability of using sieved or unsieved maize mash for production of "OGI" - A fermented cereal food.** *Plant Foods for Human Nutrition* 42(1): 1992: 25-30

Proximate analysis of sieved and unsieved maize mash revealed that there was a decrease in the protein and lipid content of the sieved maize mash as compared to that of the unsieved maize mash. Crude fibre and ash was completely absent in the sieved maize mash, while they were present in the unsieved mash. Chemical analysis of the fermented unsieved maize mash revealed an increase in the protein content from 9.9% (unfermented) to 13.4% after 3 days of fermentation, whereas the protein content of the sieved maize mash increased from 7.1% (unfermented) to 8.4% after the same period of fermentation. Furthermore, the results revealed that the protein content of the fermented unsieved maize mash was 32.1% higher than that of the fermented sieved maize mash indicating that the unsieved maize mash was of better nutrient quality and should be preferred to sieved maize mash for use in "ogi" production. AA

Proso millets

2082

Delost-Lewis (K), Lorenz (K) and Tribelhorn (R). **Puffing quality of experimental varieties of proso millets (*Panicum miliaceum*).** *Cereal Chemistry* 69(4): 1992: 359-365

Eight experimental var. of proso millet were studied to determine varietal differences in puffing quality. The grains were raised to 12, 15 or 18% moisture, equilibrated for 72 h, and gun puffed at 140 psi. Significant differences in puffing quality were observed on the basis of puffed yields and expansion volumes. Variety 2027, which demonstrated good puffing quality, was selected for further studies of the physical, nutritional and functional properties of products processed under various puffing conditions. A factorial arrangement of treatments was used. The grains were raised to 12, 15 or 18% moisture, allowed to equilibrate for 72 h, and gun puffed at 120, 140 or 160 psi. Puffing quality was significantly improved when grains were tempered to 15 or 18% moisture and gun puffed at 140 or 160 psi. The puffed products were more highly expanded, less dense, and higher in protein content, but lower in ash and total dietary fiber, than those tempered to 12% moisture or gun puffed at 120 psi. In vitro nitrogen digestibility of the puffed products was adversely affected by low moisture and the intense heat treatments required to reach high pressures. The puffed products demonstrated a much greater rate of in vitro starch digestibility than unprocessed millet. Nitrogen solubility of the puffed products was greatly reduced under all process conditions. AA

Sorghum

2083

Mulimani (VH) and Supriya (D). **α-amylase inhibitor activity in sorghum grains. Effects of cooking and UV radiation.** *Journal of Food Science and Technology (India)* 30(5): 1993: 321-323

Cooking and UV radiation decreased the amylase inhibitory activity, the loss of which in pre-soaked sorghum (*Sorghum bicolor* M) seeds after these heat treatments was more drastic than in heat treated raw seeds. Sorghum products - popped sorghum and *idli* did not exhibit any amylase inhibitory activity. SD

2084

Mazher (H), Chandrashekar (A) and Shetty (HS). **Isolation and immunochemical characterization of the alcohol-extractable proteins (kafirins) of *Sorghum bicolor* (L) Moench.m** *Journal of Cereal Science* 17(1): 1993: 83-93

The differential extractabilities of kafirins were exploited in purifying α-, β- and γ-kafirins. Polyclonal antibodies were raised against them. Immunoblotting showed no cross reactivity between the 3 kafirins. Nitrogen analysis, sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE), immunoblotting and enzyme linked immunosorbent assay (ELISA) were used to demonstrate the qualitative and quantitative differences between kafirins and cross-linked kafirins. ELISA indicated that increased

extractability of β- and γ-kafirins was responsible for the increase in the total kafirin extracted when reducing agent was added to aqueous *t*-butanol. All 3 kafirin antibodies reacted with specific prolamins from other tropical millets and cereals suggesting homologies amongst the prolamins contained within them. AA

2085
Kavitha (R) and Chandrashekar (A). **Content and composition of nonstarchy polysaccharides in endosperms of sorghums varying in hardness.** *Cereal Chemistry* 69(4): 1992; 440-443

Nonstarchy polysaccharide content and composition in the endosperm of sorghum grains varying in hardness was estimated. Soft grains appeared to contain more water-soluble and water-insoluble nonstarchy polysaccharide, whereas the hard grains contained more cellulose. There was more pentose than hexose and more arabinose than xylose in the water-insoluble nonstarchy polysaccharide in soft grains than there was in hard grains. Similar but more pronounced differences were seen between hard and soft portions of the endosperm within kernels. Varietal differences in nonstarchy polysaccharide content and composition reflected compositional differences between the two endosperm types. The presence of linear hemicelluloses and cellulose in cell walls of the hard grains and hard portions of the endosperm may have contributed to rigidity and strength. AA

2086
Gomez (MI), House (LR), Rooney (LW) and Dendy (DAV). **Utilization of sorghum and millets.92-9066-160-7, ICRISAT, Andhra Pradesh-502 324, India.** viii+216: 1992

This book is a compilation of 28 papers plus working group discussions concerning policy, practice and potential relating to the uses of sorghum and millets throughout the world. The book has two sections. The first contains the 28 papers, which are grouped into 4 categories: primary processing of food, secondary processing of food, industrial uses and feeds. The second section reports the results of the working group discussions. A description of the methodology used to record the discussion results is followed by the spreadsheets used to obtain them and the overall recommendations of the workshop. CSA

Sorghum flour

2087
Verbruggen (MA), Beldman (G), Voragen (AGJ) and Hollemans (M). **Water-unextractable cell wall material from sorghum: Isolation and characterization.** *Journal of Cereal Science* 17(1): 1993; 71-82

A procedure for the isolation of water-unextractable cell wall material (WUS) from flours of sorghum and polished sorghum (*Sorghum vulgare* cv. Fara Fara) is described. The composition of all fractions obtained was determined and a mass balance made. For whole grain, as well as for polished sorghum, 87% (dry wt.) of the flours was recovered in the fractions. The analysed components, being mainly starch, protein and non-starch polysaccharides (NSP), accounted for 84-100% (dry wt.) of almost all fractions. For whole grain and polished sorghum, respectively, the WUS fractions accounted for 5.3 and 1.05% of the flour and contained 2.8 and 1.9% starch, 6.8 and 13.9% protein and 73.6 and 61.0% NSP (dry wt.). These NSP were composed mainly of arabinose, xylose, glucose and uronic acid. The polysaccharide composition of the outer layers is similar to that of the inner layers of the sorghum kernel as is seen by comparison of the neutral sugar composition in whole grain and polished sorghum and in the grindings obtained after polishing. Most of the non-starch glucose is present as cellulose and (1-3), (1-4)-β-D-glucan. The arabinoxylan present in sorghum is highly substituted (arabinose/xylose-0.9) and contains uronic acids, acetyl and feruloyl substituents. AA

PULSES

2088
Hoppner (K) and Lampi (B). **Folate retention in dried legumes after different methods of meal preparation.** *Food Research International* 26(1): 1993; 45-48

Twenty-five different samples of legumes were analyzed for total folate. A composite sample of each legume was prepared and assigned to usual cooking time categories, 20, 90 and 150 min. Within each cooking time the legumes were pretreated with a quick soak (brought to a boil and held for 2 min, covered and left to soak for 1 h) and a long soak method (soaked in water overnight for 16 h). The av. folate retention in legumes cooked for 20 and 90 min differed significantly (p less than or equal to 0.05). The mean retention for folate in legumes in the 20 min cooking category was 60% without presoak, 18% for quick soak versus 35% for long soak, and for 90 min cooking 31% for quick soak versus 42% for long soak. There was no significant difference (P > 0.05) in folate retention between quick (41%) and long soak (44%) pretreatment for legumes in the 150 min cooking category. The results indicate that presoak treatment can affect folate retention in meal prepared from legumes. AA

2089

Bangladesh Agricultural Research Institute (International Development Research Centre International Crops Research Institute for Semi-Arid Tropics). **Advances in Pulses Research in Bangladesh. Proceedings of the Second National Workshop on Pulses. Joydebpur, Bangladesh.6th - 8th June, 1989, ICRISAT, Patancheru, A.P., India.** ix+254; 1991

Apart from other articles the proceedings also covers articles by Umaid Singh and Jambunathan, R. on pulses as a substitute for animal protein (pp. 191-197, 21 refs); Faris, D. G. and Gowda, C. L. L. on networking and the Asian grain legumes network's role in strengthening pulses research in Bangladesh (pp. 201-206, 6 refs); Jagdish Kumar on the role of ICRISAT in the improvement of chickpea in Bangladesh (pp. 207-213, 12 refs); Reddy, M. V. on integrated control of pulse diseases (pp. 215-220, 4 refs) and Bahl, P. N. on the problems and production in India (pp. 221-222). CSA

2090

Savelkoul (FHMG), Van Der Poel (AFB) and Tamminga (S). **The presence and inactivation of trypsin inhibitors, tannins, lectins and amylase inhibitors in legume seeds during germination. A review.** *Plant Foods for Human Nutrition* 42(1): 1992; 71-85

During the germination of legume seeds, enzymes become active in order to degrade starch, storage-protein and proteinaceous antinutritional factors. The degradation of storage-protein is necessary to make peptides and amino acids available in order to stimulate seed growth and early plant growth. Proteinaceous antinutritional factors such as amylase inhibitors, lectins and trypsin inhibitors are present in legume seeds and protect them against predators. However, during germination, they degrade to a lower level by the action of several enzymes. The effect of germination on the content and activity of amylase inhibitors, lectins, tannins and trypsin inhibitors is discussed. AA

Chickpeas

2091

van Rheenen (HA), Saxena (MC), International Crops Research Institute for the Semi-Arid Tropics and International Center for Agricultural Research in the Dry Areas. **Chickpea in the Nineties: Proceedings of the Second International Workshop on Chickpea Improvement, Patancheru, A.P.4th - 8th December 1989, 92-9066-181-X, ICRISAT, Patancheru, A.P., India.** vii+403; 1990

This proceedings covers papers presented by Pimbert, M. P. on some future research directions for integrated pest managemetn in Chickpea: a viewpoint (pp. 151-163); Insect pest problems and recent approaches to solving them on chickpea in South Asia by Ahmed, K. et al (pp. 165-168); Damage/yield relationships due to *Helicoverpa armigera* (Hubner) larvae in chickpea in India by Sehgal, V. K. (pp. 177-179); Host-plant resistance to *Helicoverpa armigera* in different agroecological contexts by Lateef, S. S and Sachan, J. N. (pp. 181-189). CSA

Cowpeas

2092

Marconi (E), Carnovale (E), Di Nola (A) and Brosio (S). **NMR assessment of water uptake in different *Vigna* spp. seeds.** *International Journal of Food Science and Technology* 28(1); 1993; 25-33

This paper reports a new and advantageous NMR spectroscopic method to study the variations in the uptake of water in different *Vigna* spp. accessions and effect on nutritional quality and insect resistance of cowpea. The time required to reach saturation hydration capacity ranged from 3 to 16 h; the total amount of absorbed water varied from 1.06 to 1.39 g H_2O g^{-1} sample and kinetic constant from 8.2 to 20.4 10^{-3} mm^{-1}. Accessions with a rough seed coat showed a fast water uptake within the first hour while some accessions with smooth seed coat needed an activation period of 1-5 h. No relationships were observed between kinetic constant, absorbed water and protein content or morphological characteristics. Dehulled wild sp. absorbed water at similar rates to cultivated cowpeas. NMR thus forms a suitable technique to investigate some technological characteristics of legumes related to domestic and industrial processing (cooking, canning). GS

Mucuna monosperma

2093

Arulmozhi (M) and Janardhanan (K). **The biochemical composition and nutritional potential of the tribal pulse, *Mucuna monosperma* DC. ex Wight.** *Plant Foods for Human Nutrition* 42(1); 1992; 45-53

Two germplasms fo the tribal pulse, *Nucuna monosperma* Dc. ex Wight, viz., {1} Thirunelly Reserve Forest, Wynaad District (Kerala) and {2} Siruvani Reserve Forest, Coimbatore District (Tamilnadu), were analysed for proximate composition, total (true) seed proteins, seed ptotein fractionation, amino acid composition, fatty acids,

minerals and antinutritional factors. Crude proteins, crude lipids, ash and nitrogen free extractives constituted 23.10%, 4.36%, 3.80%, 61.74% respectively, in Tamilnadu germplasm; whereas, in Kerala germplasm they constituted 20.13%, 8.99%, 3.60% and 61.69% respectively. The calorific values of 100 g dry matter of seed material are 408.19 KCal (Kerala) and 378.60 KCal (Tamilnadu) germplasms. Essential amino acids like methionine, cystine, threonine and valine were found to be limiting in the seed proteins of both the germplasms. The fatty acids like lauric acid and palmitic acid are found to be common in both the germplasm seed samples, while linoleic and oleic acids in Kerala germplasm and stearic acid in Tamilnadu germplasm are present. Tamilnadu germplasm seems to be a rich source of Na, Mg, Zn, Mn, Cu and Fe; whereas the Kerala germplasm seems to be a rich source of phosphorus. Antinutrional substances like total free phenols, tannins, L-DOPA, trypsin inhibitor activity and phytohaemagglutinating activity also were investigated. AA

Peas

2094

Ben-Hdech (H), Gallant (DJ), Robert (P) and Gueguen (J). **Use of near infrared spectroscopy to evaluate the intensity of extrusion-cooking processing of pea flour.** *International Journal of Food Science and Technology* 28(1): 1993: 1-12

Twenty-five different pea extrudates were produced using a Clextral BC45 twin-screw extruder. Near infrared reflectance (NIR) spectra of the extrudates were recorded between 1100 and 2500 nm. The application of principle component analysis (PCA) on these spectral data permitted discrimination between the extrudates produced under moderate, intermediate or severe conditions of extrusion-cooking. The study of protein quality through solubility experiments, polyacrylamide gel electrophoresis, detn. of available basic amino acids and brown colour measurement showed that, under moderate conditions of extrusion-cooking, protein was only slightly affected. All protein subunits could be restored after solubilization in phosphate buffer containing a detergent and a reducer of disulphide bonds. However, under severe conditions of extrusion-cooking, the extrudates exhibited a relatively intense brown colour and all protein fractions were implicated in non-disulphide covalent bonds and underwent some macromolecular degradation. Therefore, the spectral discrimination between pea extrudates which was related to the processing parameters, could also be related to the degree of transformation of these extrudates. Thus, the method may be used to classify an extrudate produced under unknown conditions by projecting its spectrum on the similarity maps obtained by PCA on a known collection of extrudates. AA

Pigeon peas

2095

Verma (P), Saxena (RP), Sarkar (BC) and Omre (PK). **Enzymatic pretreatment of pigeon pea (*Cajanus cajan* L.) grain and its interaction with milling.** *Journal of Food Science and Technology (India)* 30(5): 1993: 368-370

Max. hulling efficiency of 88.93% was obtained at 0.08 g of total enzyme protein content mixed in 260 g of pigeon pea grain. The optimum levels of enzymatic hydrolysis parameters - were incubation temp. 46.5°C, treatment period 12.7 h and moisture content of grain 26.6% w.b. SD

OILSEEDS AND NUTS

Almonds

2096

Berry (SK), Sehgal (RC) and Teotia (MS). **Studies on green almonds-varietal characteristics.** *Beverage and Food World* 19(5): 1992: 54-55

Green almonds (*Prunus amygdalus* Batsch) were examined for their physicochemical characteristics with respect to fruit size and varietal differences. Fruit size in general, did not show any marked differences in physical parameters of the fruit and chemical composition of the kernel. The var. Bruce, Local Selection and Local Selection Guara contained thick, hard shells and the kernels possessed bitter taste. The oil and protein content of the 8 var. analysed varied between 32 to 39% and 33 to 38% respectively. There was wide variation in total sugars content among the var. Prianyag and Tree no. 14 were considered more desirable because of ease in breaking open the shell, high kernel recovery, high av. kernel wt., thin kernel skin and appealing mild sweet taste. AA

Bambara nut

2097

Obizoba (IC) and Egbuna (HI). **Effect of germination and fermentation on the nutritional quality of bambara nut (*Voandzeia subterranea* L. *Thouars*) and its product (milk).** *Plant Foods for Human Nutrition* 42(1): 1992: 13-23

Five cvs of bambara groundnut were selected on which to study the effects of germination and fermentation on their proximate composition. The cv. that had the highest protein content was chosen to prepare unfermented and fermented milk. Standard assay techniques were adopted to determine the parameters selected for use. Germination caused a decrease in the protein, carbohydrate and starch, it increased sugar content, and had varied effects on the lipids contents of the dry samples. The anti-nutritional factor-tannin concn. was decreased. Germination and fermentation had varied effects on the nutrient compositions of the milk. Compared to the control, germination had the same effect as in the seeds. Fermentation further decreased some of the nitrogenous constituents, sugar and starch content of the milk and much drastically the tannin content. Hydrolysis and other metabolic changes freed the nutrients from their bound forms while decreasing the quantity, but increasing the quality and availability of the nutrients. AA

Coconuts

2098

Cherian (S) and Chandrasekharan Nair. **Changes in nutrient content of coconut water as a result of root (wilt) infection.** *Madras Agricultural Journal* 80(9); 1993; 537-540

Eight month old coconuts affected by root (wilt) disease were analysed for their nutrient contents. The total sugar content varied only slightly from 2.02 to 2.20 g/100 ml. The amino acid content which varied from 96.32 to 113.50 mg/100 ml coconut water was the lowest at the initial stage of the disease and increased with the disease. Ash content which varied from 0.564 to 0.439 g/100 ml of coconut water decreased with increase in disease. Na content varied from 268 to 232 mg/100 ml, K from 194 - 221 mg/100 ml, Ca from 15.63 to 22.45 mg/100 ml, Mg from 9.89 to 13.39 mg/100 ml and P content from 6.36 to 9.44 mg/100 ml of coconut water towards the advanced stage of the disease. GS

Cottonseeds

2099

Sanni (AI) and Ogbonna (DN). **Biochemical studies on *Owoh* - a Nigerian fermented soup condiment from cottonseed.** *Food Microbiology* 9(3); 1992; 177-183

The effect of fermentation on the biochemical composition of cotton seed and the fermented product owoh is reported. There was a reduction in the gossypol content of cotton from 0.055 mg g^{-1} in the unfermented seed to 0.015 mg g^{-1} in the fermented product. Apart from K, an increase in all the mineral elements in owoh was obtained, while a decrease in the values of total lipids, ash and crude fibre was recorded. A decrease in the total nitrogen and protein is also reported. Enzyme activities during fermentation revealed an initial increase in amylase activity with a peak at 12 h followed by a sharp decline at 24 h. For proteinase, high activity culminating in a peak at 24 h and a decline at 48 h was observed. However, there was a gradual increase in the lipase activity until the end of fermentation. AA

Groundnuts

2100

Evranuz (EO). **The effects of temperature and moisture content on lipid peroxidation during storage of unblanched salted roasted peanuts: Shelf-life studies for unblanched salted roasted peanuts.** *International Journal of Food Science and Technology* 28(1); 1993; 193-199

The effects of temp. and moisture content on fat oxidation (peroxide value) during storage of commercial unblanched salted roasted peanuts were investigated by storing 1.4 plus or minus 0.02% moisture samples at 15, 25, 35 and 1.4 plus or minus 0.02%, 2.2 plus or minus 0.04%, 2.86 plus or minus 0.03%, 3.9 plus or minus 0.06% moisture samples at 35°C. Oxidation took place even at low temp. and the rate of oxidation was especially accelerated at high temp. The Q_{10} value for peroxidation was calculated as 1.60 from the shelf-life plot (r = 0.821). The accelerated shelf-life test at various moisture contents showed rate of peroxide formation is decreasing near or above BET monolayer value, 2.13%, calculated from the BET equation (r = 0.997) and then increasing with further increase in moisture content. In order to prevent the loss of desirable crispness of the product BET monolayer value is proved to be the most suitable for extending shelf-life. AA

2101

Hamaker (BR), Valles (C), Gilman (R), Hardmeier (RM), Clark (D), Garcia (HH), Gonzales (AE), Kohlstad (I), Castro (M), Valdivia (R), Rodriguez (T), Lescano (M). **Amino acid and fatty acid profiles of the Inca peanut (*Plukenetia volubilis*).** *Cereal Chemistry* 69(4); 1992; 461-463

The Inca peanut (IP), *Pl. volubilis*, is a potential new crop indigenous to the high-altitude rain forests of the Andean region of South America. It grows as a vine and produces seeds that have a nutlike appearance and contain high amounts of oil (54%) and protein (27%). Amino acid analysis of the protein showed relatively high levels of cysteine,

tyrosine, threonine, and tryptophan compared to other oilseed proteins found in the region. The IP protein is comparable to soy protein in its content of total essential amino acids and, if well digested, would compare well to the FAO WHO/UNU amino acid scoring pattern, being marginally deficient only in lysine (43.vs. 58 mg/g of protein) and leucine (64 vs. 66 mg/g of protein). The oil contains high levels of linoleic and linolenic acids. AA

2102

Mehan (VK), McDonald (D), Haravu (LJ) and Jayanthi (S). **The groundnut aflatoxin problem review and literature database.ICRISAT, Patancheru, Andhra Pradesh-502 324, India.** vi+387; 1991

Contains reviews of important aspects of the groundnut aflatoxin problem together with annotated bibliographies. Aspects covered include aflatoxicosis in animals and humans; research on aflatoxin contamination of groundnuts; biochemical changes in groundnuts; factors affecting production of aflatoxin in groundnuts in the laboratory; aflatoxins in groundnut and groundnut products; limits and regulations on aflatoxins; methods for aflatoxin analysis and management of aflatoxin contamination. CSA

Soybeans

2103

Kulkarni (SD), Bhole (NG) and Sawarkar (SK). **Spatial dimensions of soybeans and their dependence on grain moisture conditions.** *Journal of Food Science and Technology (India)* 30(5); 1993; 335-338

Spatial dimensions of soybean grains were determined for each lot at different moisture contents up to 114% d.b. A typical phenomenon of increase in dimensions was observed. Grain length increased by over 60%, whereas the changes in breadth and thickness were about 20 and 16%, respectively for increase in moisture content upto 114% d.b. In addition, about 18% decrease in grain sphericity, 26% increase in size and over 90% increase in 1000 grain mass were observed. These major changes in the longitudinal direction alone would lead to increase in aerodynamic properties of the material. The data, thus, indicate the need to design the individual system for each moisture content range of the soybeans. AA

2104

Kanekar (P), Joshi (N), Sarnaik (S) and Kelkar (A). **Effect of fermentation by lactic acid bacteria from soybean seeds on trypsin inhibitor (TI) activity.** *Food Microbiology* 9(3); 1992; 245-249

Lactobacillus plantarum, *Streptococcus lactis* and *Pediococcus halophilus* constituted the lactic flora of soybean seeds. Fermentation of soy flour mixed with Bengal gram flour for 18 h at 30°C resulted in a decrease in TI activity by 5.77% and yielded a fermented food *soy-dhokla*. The effect of fermentation by *L. plantarum* on TI activity from nutrient medium amended with TI and from soy flour showed decrease in TI activity of 4.7% in nutrient medium and 5% in soy flour. Since the soy flour had native lactic flora, the fermented food product could be obtained without addition of curds. This is an advantage of soybean for introduction in the fermented foods. SRA

2105

Mohamed (AI) and Rangappa (M). **Screening soybean (grain and vegetable) genotypes for nutrients and anti-nutritional factors.** *Plant Foods for Human Nutrition* 42(1); 1992; 87-96

Fifty six genotypes of grain-type soybean and 17 genotypes of vegetable-type soybean collections were analyzed for protein and oil content, trypsin inhibitor, and lipoxygenase activities. The protein and oil content ranged from 36.9 to 47.9% and from 13.3 to 23.0% for different accessions in grain- and vegetable-type soybeans, respectively. Trypsin inhibitor and lipoxygenase activities ranged from 22.0 to 47.0 trypsin inhibitor units/mg meal and from 482 to 6265 lipoxygenase units/min/mg meal for grain- and vegetable-type soybeans, respectively. Significant correlations ($r = -0.62$ and -0.52, $P < 0.05$) were found between protein and oil, and between protein and trypsin inhibitor. A significant positive correlation ($r = 0.42$, $P < 0.05$) was also calculated for oil and lipoxygenase activity. Several genotypes of soybean and vegetable soybean (plant introductions 423905, 417330, 47223, 171451, 200506, 200523, 417124, 227687, 203402, 445842, 203399, 423852, 416771, FC 31927, Avoyelles and Sooty) showed good nutritional potential and may be useful in a breeding program to improve the nutritional quality of soybean. Screening for essential amino acids, fatty acids, and trace minerals for selected genotypes is underway. AA

Sunflower seeds

2106

Rovedo (CO), Aguerre (RJ) and Suarez (C). **Measuring and modelling the water vapour desorption in sunflower seed.** *International Journal of Food Science and Technology* 28(2); 1993; 153-158

Water activities of sunflower seed (whole), hull and endosperm were measured at 25, 40 and 50°C and different moisture contents by means of an electronic a_w-meter in the range 0.199 - 0.867. Based on the equilibrium between the water in air and a constant moisture specimen, the method permits a direct measurement of the isosteres and was used to estimate the variation of the isosteric heat with moisture content. In the range of temp. investigated it was found that the isosteric heat is practically independent of temp. The hygroscopic equilibrium data of the different materials were modelled by a BET-type two parameter isotherm for the whole range of a_w investigated. AA

TUBERS AND VEGETABLES

Root vegetables

Carrots

2107

Reiss (J). **Reduction of nitrate in carrot juice by immobilized cells of *Staphylococcus carnosus*.** *Deutsche Lebensmittel-Rundschau* 88(11): 1992: 352-353

Various concn. of lyophilized *Staph. carnosus* cells were immobilized in Ca-alginate and anaerobically incubated in carrot juice with an addition of 1 g sodium nitrate per liter. Nitrate, nitrite and pH were determined continuously during the incubation period of 5 h at 30°C. The optimal bacterial concn. was 0.5 g/100 ml juice, leading to a reduction rate of 28% after 4 h. Nitrite was never found during the incubation; the pH value was between 6.7 and 7.1 *Staph. carnosus* must be considered to be "food-safe" but its use for reducing the nitrate level in carrot juice is restricted by the relatively low degradation rate. AA

Cassava

2108

Gidamis (AB), O'Brien (GM) and Poulter (NH). **Cassava detoxification of traditional Tanzanian cassava foods.** *International Journal of Food Science and Technology* 28(2): 1993: 211-218

Four methods for processing cassava roots and one for leaves, all traditional in Tanzania, were evaluated for their effectiveness in removing the 3 types of cyanogens present by using a modification of the enzymic colorimetric method of Cooke (1978). All 4 root methods reduced cyanogens substantially by 90-98%, and in 3 the main residual cyanogen was cyanohydrin. The least effective method was dry ('solid state') fermentation. The processing stages of comminution and slow drying were most effective for cyanogen removal. In fresh cassava leaves pounding reduced cyanogens by 86%, and subsequent boiling reduced the level to 96% of the initial value. AA

Vegetables

2109

Garg (N), Churey (JJ) and Splittstoesser (DF). **Microflora of fresh cut vegetables stored at refrigerated and abuse temperatures.** *Journal of Food Science and Technology (India)* 30(5): 1993: 385-386

The microflora of commercially packaged spinach, cauliflower and carrots was compared after storage for 7 days at 3.3 and 15°C. Storage at 15°C produced significantly high aerobic counts in spinach, cauliflower florets and carrot sticks, but not in cauliflower heads and whole carrot. Psychrotrophic species made up a significant proportion of the microflora at both the temp. Little growth of coliform and lactic acid bacteria was observed at either temp. AA

2110

Muller (H). **Determination of folic acid contents in vegetables and fruits by means of high-performance liquid chromatography (HPLC).** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(2): 1993: 137-141 (De)

The folic acid content of vegetables (including potatoes) and fruits was determined by means of HPLC. Free folate (monoglutamate forms) and total folate (monoglutamate + polyglutamate forms) are differentiated. Vegetables contained 27-187 µG/100 g and fruits 10-80 µg/100 g total folate. The free folate portion ranged from 6.3% to 96.8% (mean 35%) in vegetables and from 11.6% to 89.0% (mean 56%) in fruits. In addition, the results of the quantification of the main folate derivatives tetrahydrofolic acid (THF), 5-methyltetrahydrofolic acid (5-CH_3-THF) and 5-formyltetrahydrofolic acid (5-CHO-THF) are presented. The mean values were 70% 5-CH_3-THF, 20% 5-CHO-THF and 10% THF. Their total, resulting, is comparable with the results of microbiological methods reported in the tables of nutritive values. AA

Leafy vegetables

2111

Chiriotti Editori. **Proceedings of the Third International Conference on Leaf Protein Research. Italy-Pisa, Perugia, Viterbo.1st - 7th**

October, 1989. 88-85022-35-9, Chiriotti Editori, Pinerolo-Italy. 1-552: 1990

Some of the papers covered in the proceedings are World small-scale operationplants by Joshi, R. N. (pp. 206-209); Sugar beet tops - protein extractions and nutritional evaluation by Barik, S. and Matai, S. (pp. 231-236); Presentation and acceptability of food preparations containing leaf protein conc. by Mathur, B. and Joshi, R. N. (pp. 246-252); Selection and health status of 2 different communities for a possible acceptance trial of leaf protein: A pilot study of Gupta, S. S. and Matai, S. (pp. 308-314); Vegetable protein hydrolysate utilization for human use by Savangikar, G. (pp. 340); Liver enzyme levels and kidney transamidinase levels in albino rats fed diets based on wheat flour and wheat flour supplemented with agathi (*Sesbania grandiflora*) leaf protein conc. by Govindan, S., Shanmugasundaram, E. R. B.; and Radhashanmugasundram, K. (pp. 345); Leaf protein as a technology aid to cover basic human needs by Devadas, R. P.; and Vijayalakshmi, P. (pp. 354-359); Challenges in Commercialisation of microalgae by Venkataraman, L. V. and Becker, E. W. (pp. 404-411); Leaf protein conc. from mulberry (*Morus alba* L.) tree leaves by Srivastava, G. P. and Mohan, M. (pp. 412-415); Potential protein fractionation and its by-products from vegetable crop wastes by Bhattacharya, B. (436-439); Economic factors responsible for profitable commercial leaf protein production by Savangikar, V. A. (pp. 500); Cholorococcalean algae for utilisation as a source of proteins by Srivastava, P. and Dadheech, P. K. (pp. 502); Studies on some properties of algal proteins by Dua, S., Kaur, M. and Ahluwalia, A. S. (pp 502). CSA

Endives

2112

Morris (CE) and Lucotte (T). **Dynamics and variability of bacterial population density on leaves of field-grown endive destined for ready-to-use processing.** *International Journal of Food Science and Technology* 28(2): 1993: 201-209

To quantify the variability and dynamics of bacterial populations on field-grown broad-leaved endive (*Cichorium endiva* cv. Samy) destined for ready-to-use processing, plants were sown at 3 dates in 1990 for cultivation during the autumn season in Southern France. Densities of populations of total, fluorescent pseudomonad and pectolytic bacteria were determined for entire seedlings in the greenhouse and for outer and inner leaves of plants in the field throughout the season until harvest. On seedlings from the greenhouse, bacteria were always detected but fluorescent and pectolytic bacteria were only sporadically detected and generally composed less than 0.1% of the total population. In the field there were significant differences in total, fluorescent and pectolytic bacterial populations on outer and inner leaves, among different plants of the same age, and among inner leaves sampled at the 3 different dates of harvest. The variability observed suggests that it is reasonable to pursue development of cultural or industrial sorting methods to reduce the microbial load of endive destined for ready-to-use processing. AA

Tomatoes

2113

Saini (SPS) and Singh (S). **Thermal processing of tomato juice from new hybrids.** *Research and Industry, India* 38(3): 1993: 161-164

Five new high yielder tomato hybrids namely NH-15, NH-25, NH-2476, NH-3025 and NH-3027, and one new non-hybrid 1.7 - 1.1 cv were tested for processing into juice. Physico-chemical changes occurring as a consequence of thermal processing were also recorded. Reducing sugars improved slightly. Acidity changed marginally with pH remaining constant. Ascorbic acid was the max. sufferer with 9.92% loss. Pectin, tannin and ash did not change. High amount of lycopene (4.56 mg/100 g) remained unaltered showing thermal stability of tomato carotenoids. 1.7 - 1.1 cv measured highest value of 30 for Tintometric red colour. Physico-chemical analysis of fresh and processed juices followed by sensory evaluation of packed product established the superiority of new promising cv. for converting into juice over the standard processing var. of Punjab chhuhara. AA

2114

Bergeuin (M), Heureux (GPL) and Willemot (C). **Tomato fruit chilling tolerance in relation to internal atmosphere after return to ambient temperature.** *Hortscience* 28(2): 1993: 138-140

Mature-green 'vedette' tomato (*Lycopersicon esculentum* Mill) fruit were stored with (+P) or without (-P) peduncles at 1°C and subsequently returned to 20°C (ambient temp.). The influence of fruit internal atm. composition on chilling injury (CI) symptom development was examined. The +P fruit accumulated > 4% CO_2 and eventually developed CI. As +P fruit chilled for 6 days and returned to ambient temp. did not develop CI symptoms. The -P fruit were largely unaffected and ripened normally at ambient temp. The CO_2 content of -P fruit internal atm. was significantly lower than in +P tomatoes after return to ambient temp. The peduncle scar has a greater permeability to gases than the skin and facilitates gas exchange with external atm. SRA

2115

Torreggian (D). **Osmotic dehydration in fruit and vegetable processing.** *Food Research International* 26(1): 1993: 59-68

The basic principles which control osmotic dehydration of fruit and vegetables are reported together with the most important parameters and their influence on the process. The effects of osmosis as a pre-treatment, mainly related to the improvement of nutritional, sensorial and functional properties of the products, are analyzed. The distinctive aspect of this process, when compared to other dehydration methods is the 'direct formulation' achievable through the selctive incorporation of solutes, without modifying the food integrity. By balanching the two main osmotic effects, water loss and soluble solids uptake, the functional properties of fruit and vegetables could be adapted to many different food systems. Present application of the process are shown and problems related to a further industrial development are analyzed. AA

2116

Charan (R) and Sharma (GP). **Fruit preservation through controlled atmosphere.** *Beverage and Food World* 19(5): 1992: 25-26

Briefly discusses biochemical aspects, biosynthesis and effect of ethylene, and controlled atm. storage. BV

2117

Georges (AN) and Simard (RE). **Characteristics of juice from palmyrah palm (*Borassus*) fruit.** *Plant Foods for Human Nutrition* 42(1): 1992: 55-70

The ancestral palmyrah palm (*Borassus aethiopum Mart.*) produces in the V-Baoule region of Cote d'Ivoire, sweet and fragrant fruits in large numbers. Most of these spoil in the bush when ripe. The present work was to develop an efficient process for the extraction of juice from these fruits using a pectinase (Pectinex Ultra SP-L) at different concn. (0.2, 0.4 and 0.6 mg/kg), temp. (25, 35 and 45°C), and for different time (30, 60, 90 and 120 min). Some physico-chemical characteristics of the juice were determined in order to evaluate the quality of the product. Treatment of 45°C for 120 min at an enzyme concn. of 0.6 mg/kg was selected for highest juice yield (73.14%). The colour parameters (L; a; b) fluctuated in intensity between batches of rehydrated material. Juice consistency was found to be stable at 45°C at the enzyme concn. used. There was a slight variation in pH among the different treatments. In general, the yield and quality of the juice obtained were affected by treatment temp., enzyme concn. and maceration time. AA

Apples

2118

Luo (Y), Patterson (ME) and Swanson (BG). **Scanning electron microscopy structure and firmness of papain treated apple slices.** *Food Structure* 11(4): 1992: 333-338

Textural changes by Instron showed that McIntosh apple slices submerged for 24 h in 1% papain sol. were significantly firmer than the control submerged in distilled water. A significantly smaller decay index observed in slices submerged in papain for 3-4 days than the control slices. SEM data revealed less severe cell wall breakdown in slices treated with papain sol. and the cell structure in 18 h treated slices was unaffected while the cells in control slices collapsed. SD

2119

Gussman (CD), Goffreda (JC) and Gianjagna (TJ). **Ethylene production and fruit softening rates in several apple fruit ripening variants.** *Hortscience* 28(2): 1993: 135-137

Ethylene production and fruit firmness were compared during postharvest storage using 3 numbered selections (NJ55, D101-110, and PA14238) and 2 commercial apple cvs ('Red chief delicious' and 'Golden delicious') as standards. PA14238 and D101-110 produced < 10 $\mu lkg^{-1}.h$ ethylene level at harvest and throughout most of 86 days of storage at 4°C. Commercial cvs produced > 100 µl ethylene/kg/h during the same time period. PA14238 and D101-110 flesh disks converted aminocyclopropane-1-carboxylic acid (ACC) but not methionine to ethylene. 'Red chief delicious' readily converted both methionine and ACC to ethylene at the end of cold storage. PA14238 fruit were the firmest and D101-110 fruits softened during post harvest storage. NJ55 did not produce ethylene at harvest, but produced a significant amount of ethylene (90 $\mu lkg^{-1}hr$) during storage. Despite its high capacity to produce ethylene. NJ55 remained firm at the end of cold storage. SRA

Limes

2120

Thangaraj (T). **Effect of pre-storage dip treatments of fungicides and 2,4-D in the extension of**

shelf-life of acid lime fruits. *Madras Agricultural Journal* 80(2): 1993: 47-49

The influence of certain fungicides and 2,4-D as pre-storage dips on the shelf-life of acid lime fruits was studied. The changes in physiological loss of wt. (PLW), juice content, peel content, TSS, acidity and ascorbic acid were recorded. PLW showed no significant deviations among treatments. Treatments 2,4-D 50 and 100 p.p.m. were superior to other treatments and showed higher % of marketable fruits (80.3 and 86.3%) as compared to 34.6% in untreated fruits. The treatments did not alter any of the quality components. GS

2121

Thangaraj (T) and Irulappan (I). **Effect of skin coatings, 2,4-D and prepacking on the shelf-life of acid lime fruits.** *Madras Agricultural Journal* 80(3): 1993: 139-142

The extension of the shelf-life of acid lime with skin coating, 2,4-D and prepacking either alone or in combinations was experimented. The physiological loss of wt. ranged from 0.8 to 11.4%; the marketable shelf-life varied from 5.3 days (2,4-D 100 p.p.m.) to 25.3 days (2,4-D 100 + frutox 4 + prepackaging). Prepackaging enhanced the shelf-life upto 17 days. The intensity of storage decay was of higher order (18.3) in frutox 4% + prepacking. Ascorbic acid level varied from 20.00 to 33.43 mg. A slight reduction in peel content was recorded in frutox 4, frutox 8, 2,4-D, 2,4-D + frutox 4 and prepacking treatments. The juice content increased slightly in all the treatments involving 2,4-D either alone or in combination with frutox. GS

Mangoes

2122

Ranote (PS), Bawa (AS) and Saini (SPS). **Thermal process for mango pulp.** *Research and Industry, India* 38(3): 1993: 150-151

A study was conducted to determine the process time for processing of Dusehri mango pulp in polypropylene pouches (300 gauge, 15 cm x 10 cm) and glass bottles (200 ml). The heat penetration in bottled as well as pouched mango pulp took place by conduction and the slowest heating point was at the geometric centre. Peroxidase in mango pulp was taken as the test enzyme for calculating thermal inactivation and process times. The process time calculated using improved graphical interpolation method was found to be 23 1/2 and 26 min for pouched and bottled pulps respectively. AA

CONFECTIONERY, STARCH AND SUGAR

2123

Flint (SI) and Camire (ME). **Recovery of lignin during nonstarch polysaccharide analysis.** *Cereal Chemistry* 69(4): 1992: 444-447

Lignin occurs natually with nonstarch polysaccharides (NSP) in plants and may possess physiological functions when consumed. Since NSP methodology does not include lignin, the dietary fiber values obtained using this method may be lower than AOAC total dietary fiber values for foods containing lignin. Therefore the residue from NSP analysis of 11 foods was recovered gravimetrically and compared with apparent lignin determined by both Klason and permanganate methods. Whereas the NSP residue value was generally higher than values obtained by these methods, correlation was high ($r = 0.86$, Klason: $r = 0.91$, permanganate). Residue recovery from finely ground AACC wheat bran was significantly lower ($P < 0.05$) from bran that passed a no. 20 or no. 10 screen. Toasting did not affect residue recovery from whole wheat bread. The recovery of lignin during NSP analysis represents savings in time and reagents over separate analysis for lignin. AA

Starch

2124

Padmanabhan (S) and Ramakrishna (M). **Methods of estimation of starch. A critical appraisal.** *Journal of Food Science and Technology (India)* 30(5): 1993: 313-320

Available estimation methods, factors affecting their reliability, merits and limitations are reviewed. Even though enzymatic method is most accurate, acid hydrolysis method is widely used. 66 references. SD

2125

Jane (J), Xu (A), Radosavljevic (M) and Seib (PA). **Location of amylose in normal starch granules. I. Susceptibility of amylose and amylopectin to cross-link reagents.** *Cereal Chemistry* 69(4): 1992: 405-409

When granular starch was cross-linked, more amylopectin than amylose molecules were found cross-linked. For example, when corn starch was treated with cross-linking reagent (0.07% epichlorohydrin) (pH 10.5 for 24 h), 91% of its amylopectin and 45% of its amylose became insoluble. Cross-linking of pregelatinized and dispersed starch caused less difference in the proportion of soluble amylose and amylopectin than

did the cross-linking of native granular starch. After the starch had been cross-linked in the granular form, gel-permeation chromatograms showed no increase in the size of amylose as a result of cross-linking between two or more amylose molecules. However, susceptibility of the amylose to sequential hydrolysis by isoamylase and β-amylase decreased. The relative blue values of amylopectin peaks indicated that amylose was cross-linked to amylopectin. This was confirmed when the amylopectin isolated from cross-linked starches was debranched with isoamylase. These results are consistent with the view that amylose is interspersed among amylopectin molecules in corn and potato starch granules. AA

Sugars

2126

Gopalarao (C), Singh (CP) and Bhatnagar (AP). **Optimum operating time for cleaning of cane sugar juice evaporators in sugar mills.** *Journal of Food Science and Technology (India)* 30(5): 1993: 349-354

The overall heat transfer coeff. which decreased with time of operation of evaporators showed straightline relationship under the operating conditions tested, the optimum operating time for max. heat transfer in k_1 and k_3 evaporators was 1800. Evaporator cleaning once during the crushing season is sufficient at saving of nearly 50 tonnes of bagasse, detergents as well as increasing the life of evaporators. SD

2127

Harada (T), Suzuki (S), Taniguchui (H) and Sasaki (T). **Characteristics and applications of a polyfructan synthesized from sucrose by *Aspergillus sydowi* conidia.** *Food Hydrocolloids* 7(1): 1993: 23-38

The present paper describes the physical characteristics and application of polyfructan synthesized from sucrose by *Asp. sydowi* conidia. The polyfructan a white powder with no taste and flavour, can be used as a dietary fiber, as a low calorie bulking agent for sweeteners such as aspartame, or as a fat substitute in various processed foods like ice cream and baked cheese cake. BV

2128

Lim (H), Setser (CS) and Paukstelis (JV). **Comparisons of water mobility using ^{17}O nuclear magentic resonance for four sugars: Glucose, maltose, maltotriose, and sucrose.** *Cereal Chemistry* 69(4): 1993: 387-390

Water mobility in wheat starch-sugar (glucose, maltose, maltotriose, and sucrose)-water dispersions was observed as temp. was increased from 35 to 87°C by measuring the transverse relaxation rate (R_2) from the ^{17}O nuclear magnetic resonance spectra. The changes of water mobility with different sugar dispersions exhibited similar patterns. The temp. at which the R_2 max. occurred and the magnitude of the R_2 max. both increased as mol. wt. of sugars and concn. of dispersions were increased. Structural differences appeared to influence the rate of water mobility changes at the same mol. wt. Limited starch granule swelling seemed to occur with the 20% starch-1.5 M maltotriose-water dispersion and influenced the changes of R_2. AA

BAKERY PRODUCTS

2129

Vaidehi (MP), Sreelakshmi and Mushtari Begum (J). **Effect of iron-enriched baked products on body weights and haemoglobin levels of slightly anaemic and normal subjects.** *Journal of Food Science and Technology (India)* 30(5): 1993: 357-358

Enriched baked products - shepu bars, ragi rings, toffee bars, jaggery cake, ragi cake, fruit cake, pizza, brown bread, masala bun, speciality egg and enriched puff were developed by incorporating iron-rich foods, ferrous sulphate at 7-5 mg of iron/100 g of product to give 75% recommended dietary allowance as food supplement. All enriched products, being acceptable to normal and anaemic subjects, given as supplementation for 2 months. Greater increase in haemoglobin levels of anaemic subjects and equal increase in body wt. were observed. SD

2130

Natesan (V), Chakrabarty (TK) and Arya (SS). **Studies on ready-to-eat flakes and snack products from sorghum.** *Beverage and Food World* 19(5): 1992: 43-45

Breakfast cereal flakes and ready-to-eat snack food based on sorghum were developed. The principal steps involved are milling, pre-treatment, cooking, partial dehydration, flaking, drying, roasting and packaging. Both the products were found to be highly acceptable. Both the products remained stable for one year when packed in paper - Al. foil-polyethylene laminate, polyethylene and polypropylene pouches and stored at room temp. and 37plus or minus 1°C. Available lysine content did not change during milling of sorghum but its concn. in flakes was higher due to milk powder

incorporation. Concn. of available lysine in sorghum snack was slightly lower due to loss during frying operation. AA

2131
Lawton (JW). **Viscoelasticity of zein-starch doughs.** *Cereal Chemistry* 69(4): 1992: 351-355

Corn flour, when hydrated, does not form a viscoelastic dough as does wheat flour. Yet when mixtures of zein and corn starch were blended into a composite flour and mixed in a farinograph at 25, 30 and 35°C, viscoelastic doughs resembling those of wheat flour were produced. The properties of such doughs appear to result from zein fibres, produced during mixing, that are similar in appearance to wheat glutenin fibres. Dough properties were affected both by mixing temp. and final dough temp. A zein-starch dough could not be produced when mixed below 25°C, and the viscoelasticity of doughs produced at higher temp. was lost if doughs cooled to below 25°C. This temp. (25°C) is closely related to zein's glass transition temp. AA

2132
Autio (K) and Sinda (E). **Frozen doughs: Rheological changes and yeast viability.** *Cereal Chemistry* 69(4): 1992: 409-413

Stress-relaxation and small deformation oscillatory techniques were used to study the rheological changes in doughs subjected to freezing and thawing. Relative to fresh doughs, the relaxation modulus and relaxation time both decreased. Plots of storage modulus (G') and tan δ versus temp. showed a decrease in G' an increase in tan δ, and an increase in the onset temp. of starch gelatinization in frozen and thawed doughs. Yeast viability was studied by measuring the gas vol. of the dough. The viability decreased slightly during 2 wks of storage at -18°C. Dead yeast cells did not affect the rheological properties of the doughs. AA

Bread

2133
Payannavar (CS), Singhal (RS) and Kulkarni (PR). **Studies on bread-making from sprouted wheat.** *Research and Industry, India* 38(3): 1993: 138-143

The ability of trisodium phosphate (TSP) and disodium hydrogen phosphate (DSHP) to supress the α-amylase activity, changes in terms of hot paste viscosities of wheat flour slurries in water and the effect of incorporating TSP and DSHP in blends of undamaged and sprouted wheat flour were studied. DSHP decreased the activity of purified α-amylase steadily with increase in its concn. from 10-100 m mol/ml. The activity decreased rapidly to < 40% with increase in concn. of TSP upto 30 m mol/ml, beyond which the activity decreased slowly to < 20% at 100 m mol/ml. These changes were due to inactivation of α-amylase by the phosphate salts. Breads made from sprouted wheat flour blends (20 and 50%) had very low overall acceptability. The use of DSHP, mixture of TSP and DSHP, and TSP improved the baking quality of flour containing sprouted wheat. GS

2134
Scanlon (MG), Zhou (H-M) and Curtis (PS). **Tristimulus assessment of flour and bread crumb colour with flours of increasing extraction rate.** *Journal of Cereal Science* 17(1): 1993: 33-45

The changes in flour colour with extraction rate, the significance of flour colour measurements in relation to the deterioration in the baking performance of the flours, and crumb colour changes due to increased extraction rate, were assessed using flours from 3 commercial mills. Reproducible decreases in flour Z value were observed before baking performance was affected. Flour Z measurements did not appear to be as accurate as GCF in detecting the addition of individual machine flours. Differences in absolute Z values were observed both due to mills and measuring instruments. GS

2135
Panozzo (JF), Hannah (MC), O'brien (L) and Bekes (F). **The relationship of free lipids and flour protein to breadmaking quality.** *Journal of Cereal Science* 17(1): 1993: 47-62

Fourteen cvs of wheat of diverse wheat quality were grown over two seasons using 6 rates of applied N fertilizer. The relationships between protein and hexane extractable (free) lipid in flour together with the effects of year and grain hardness on breadmaking quality were investigated. As expected, there was protein response to the fertilizer treatments with the magnitude dependent upon grain hardness and year (or initial soil fertility). Free lipid response was independent of applied N and only weakly correlated with protein concn. of the grain. Hard-grained cvs had higher levels of free lipid than the softer grained wheats. Both flour protein and free lipid had a significant effect on loaf vol., the effect of free lipid remaining significant after adjustment for protein. A regression model was developed for prediction of loaf vol. in terms of flour protein and free lipid and tolerance limits calculated to quantify the precision of prediction. For example, a sample with free lipids = 0.12 g/10 g and protein = 10.0% has predicted loaf vol. of approx. 1645 ml

and no more than 1763 ml with 90% confidence. An efficient baking quality screening strategy based on this predictive model for use in wheat breeding programmes is proffered and evaluated. AA

2136

He (H), Roach (RR) and Hoseney (RC). **Effect of nonchaotropic salts on flour bread-making properties.** *Cereal Chemistry* 69(4); 1992; 366-371

Mixograph characteristics of wheat flour doughs were found to be affected by the addition of neutral salts. Changes in mixograph properties such as time to peak, peak height, or curve width were dependent on the specific ions present an their concn. In bake tests, certain salts from both the precipitating and the solubilizing portions of the lyotropic series increased loaf vol. relative to bread without salt. This was not true for all salts, possibly because of a negative action on gas production of yeast. The extent of the improvement and the optimum usage level varied for each salt. Nonchaotropic salts increased the dough strength of flours of varying quality. The order of increasing flour strength followed the order of the original strength of the flours at the same level of salt. Na_2SO_4 had a more pronounced effect than did NaCl. Compared with NaCl, Na_2SO_4 greatly improved the rheological properties and the gas-retaining ability, as well as the loaf vol. and crumb grain, of the poor-quality flour (presumably by increasing hydrophobic interactions between gluten proteins). However, the same level of Na_2SO_4 made the good-quality flour dough too elastic for breadmaking. The effect of non-chaotropic salt supported the hypotheses that the surface of the gluten proteins from the poor-quality flour was less hydrophobic than that from the good-quality flour, and that the hydrophobic interactions between proteins are important to bread quality. However, this study also demonstrated that the improvement in baking quality of poor-quality flour by salt was limited, which indicates that other factors besides hydrophobic interaction affect the baking properties of flours. AA

2137

Inoue (Y) and Bushuk (W). **Studies on frozen doughs. II. Flour quality requirements for bread production from frozen dough.** *Cereal Chemistry* 69(4); 1992; 423-428

Extensigraph properties and bread loaf vol. were determined for frozen doughs that had been stored for up to 10 wks or thawed and refrozen after an initial frozen storage period of one wk. Four flours were used: 3 differed in protein quality (strength) but contained approx. the same amount of protein, and two had the same protein quality but differed in protein content. A modified extensigraph procedure developed for fermented doughs was used in this study. Yeast activity was assessed with the gassing power test. Extensigraph results (max. resistance and extension) showed that dough strength decreased markedly on freezing and thawing and gradually during frozen storage. Similarly, loaf vol. decreased markedly with freezing and thawing and gradually during frozen storage. Results of experiments in which yeast actvity was maintained at the same level as that in nonfrozen doughs showed that the loss of dough strength on freezing, on thawing, and during frozen storage was the main reason for the decline in bread loaf vol. Accordingly, for best bread quality from frozen doughs, very strong flours should be used. Protein content, in the range covered in the present study, appears to be less important than protein quality. AA

Cakes

2138

Chauhan (J) and O'Mahony (M). **Use of a signal detection ranking analysis to measure preference for commercial and health modified cakes.** *Journal of Sensory Studies* 8(1); 1993; 69-75

Consumer preference for a common 'yellow cake' prepared from a commercially available cake mix and for 3 'health modified' cakes was measured using signal detection ranking procedures. Consumers found the ranking protocol simple to use, making it a viable alternative to hedonic scaling. Measures of likelihood to choose to eat, after provision of nutritional information about the cakes, showed the same trend as measures of preference taken before. Yet, the dominance of preference for yellow cake over the 'health modified' cakes was reduced. AA

Cookies

2139

Gaines (CS). **Collaborative studies on the baking quality of cookie flour by wire-cut type formulations (AACC methods 10-53 and 10-54).** *Cereal Foods World* 38(1); 1993; 26, 28-30

A micro- (40 g of flour) and a macro-method (225 g of flour) for the lab. production of commercially based wire-cut formula cookies were studied collaboratively. The new methods have less sucrose and more closely resemble commercial cookies (wire-cut) than do the existing lab. test baking cookie methods, which produce sugar snap cookies. Eight flours were duplicated and sent to 5 labs Collaborative baking at each lab. revealed that the new methods differentiated well and easily ranked the 8 flours on the basis of cookie diam. and height.

The standardized procedures did not contribute to significant statistical variance within each lab. Neither duplication of flour nor day of baking significantly contributed to overall statistical variance. AA

MILK AND DAIRY PRODUCTS

2140

Armbruster (BL) and Desai (N). **Identification of proteins and complex carbohydrates in some commercial low-fat dairy products by means of immunolocalization techniques.** *Food Structure* 11(4): 1992: 289-299

Immunolocalization technique to study structure-texture relationships in foods was adopted to identify β-lactoglobulin, casein, bovine whey proteins and egg albumin in low-fat frozen desserts, reduced fat process cheese, and salad dressings. Simplesse 100 protein particles were characterized and compared to naturally occurring protein structures in low-fat foods. In low-fat salad dressing hydrocolloid was identified by complexing cellulase and hemicellulase with colloidal gold and applying the probe as a pre-embedding step on sections of embedded specimens or on material dried on grids. SD

2141

Aguilera (JM), Xiong (YL) and Kinsella (JE). **Viscoelastic properties of mixed dairy gels.** *Food Research International* 26(1): 1993: 11-17

Pure and mixed gels prepared from a whey protein isolate (WPI) and skim milk powder (SMP) by heating to 90°C at pH 4.3 - 4.6, with or without fat globules, were studied by mechanical testing. The testing involved compression to 20% deformation and oscillatory rheometry (storage and loss moduli, G' and G", respectively). Compressive stresses of mixed gels varied between 0.7 and 1.9 kPa. Gels containing WPI reached higher G' values and had shorter gel-set times than those containing SMP. SMP based gels were more elastic than WPI based gels as revealed by the lower loss tangent (tan δ = G"/G') values achieved after 17 min (0.18 - 0.23 versus approx. 0.38, respectively). Addition of fat resulted in higher compressive stresses and shorter gel-set times but did not affect the initial gelation rate. Gels with different viscoelastic and mechanical properties were prepared with varying amounts of WPI, SMP and emulsified fat. AA

2142

Zbikowska (A), Dziuba (J), Ozimek (L) and Wolfe (FH). **Manufacturing processes influence the proteolytic action of rennin on casein in several dairy products.** *Food Research International* 26(1): 1993: 19-26

Research was undertaken to estimate the extent of change in milk proteins brought about by industrial processes that are utilized in the manufacture of skim milk powder, evaporated milk, sodium caseinate and sodium coprecipitate. Potentiometric titration was used to determine the differences in the accessibility of functional groups. The kinetics of release of peptides soluble in 2% (w/v) TCA and glycopeptides soluble in 12% (w/v) TCA from casein substrates by rennin were determined. The casein substrates showed a diversified susceptibility to the action of rennin. The velocity of total peptides release at pH 5.6 decreased (P less than or equal to 0.05) in the following order: reconstituted condensed milk > sodium coprecipitate > sodium caseinate > reconstituted skim milk powder. K_m values for ttal peptide release were higher (lower affinity) (P less than or equal 0.05) in sodium coprecipitate and sodium caseinate than in evaporated milk and skim milk powder. The velocity of glycopeptides release differed (P less than or equal to 0.05) for all substrates at pH 6.6. K_m values for the release of glycopeptides ranged from 4.8×10^{-5} to 5.4×10^{-5} M and were lowest (P less than or equal to 0.05) in skim milk powder at pH 6.6 and 5.6 and evaporated milk at pH 5.6. It was concluded that the susceptibility of the casein to proteolysis in milk products was influenced by processing. AA

Milk

2143

Gupta (S) and Dharam Pal. **Application of reverse osmosis for concentration of buffalo milk.** *Journal of Food Science and Technology (India)* 30(5): 1993: 344-349

Buffalo milk was concentrated to 1.5X (25% TS) and 2.0X (33% TS) levels employing reverse osmosis process and the changes in its physico-chemical, microbial and sensory properties were examined. The av. permeate flux was 30.4 and 23.8 l/m^2-h for 1.5X and 2.0X, respectively. The lipids, proteins, minerals and lactose in concentrated milk increased by the same level as the concn. factor, thereby indicating their 100% rejection by the thin film composite reverse osmosis membrane. There were no milk solids in the permeate at any stage of operation. The reverse osmosis process did not exert any adverse effect on the titratable acidity, pH, free fatty acids, free fat and microbial load. The sensory quality of reverse osmosis processed milk was not different from that of fresh buffalo milk. The most notable effect of reverse osmosis process was noticed on the size of fat globules, which reduced to less than 2.5 μ upon 2.0X concn. Consequently, the

skimming efficiency of reverse osmosis milk was extremely poor. AA

2144

Saini (SPS) and Bains (GS). **Flavour of iron fortified buffalo milk.** *Research and Industry, India* 38(3): 1993: 146-149

Standardized (5% fat buffalo milk) was fortified with Fe^{++} or Fe^{+++} at 10 p.p.m. level and there was no adverse effect on its flavour and storability. Addition of ascorbic acid/ascorbyl palamitate did not improve flavour at elevated level of fortification. Fortification with 10 p.p.m. of elemental Fe improved the nutritional status of milk. GS

2145

Tziboula (A) and Muir (DD). **Effect of starches on the heat stability of milk.** *International Journal of Food Science and Technology* 28(1): 1993: 13-24

Factors associated with the properties of the starch molecules that influence the heat stability of milk and the effect of starch additive on the stability of the milk proteins on heating are discussed. Starches from various biological sources were added (0.5 - 1.5% w/w) to skim milk and pregelatinized by heating at 70°C for 30 min. The heat coagulation time (HCT) of the milk-starch mixtures was evaluated at 140°C. Increasing the concn. of added starch caused a decrease in HCT. The amylose/amylopectin composition or the granular structure of the starches was not related to the reduction in the heat stability of milk. The heat stability of mixtures increased when the molecular structure of the starches was modified by acid hydrolysis or cross-linking. GS

2146

Lawrence (LM), Gilmour (A) and Pearce (J). **The influence of calcium on the chromogenic *limulus* amoebocyte lysate assay of lipopolysaccharide endotoxins in liquid milk.** *International Journal of Food Science and Technology* 28(1): 1993: 103-109

Ca ions were shown to have a profound effect on the chromogenic *Limulus* Amoebocyte Lysate assay of lipipolysaccharides in liquid milk. There appeared to be two optima within the range of 0-1.0 mM added $CaCl_2$, with an inhibition of the assay at Ca ion concn. between 0.2 and 0.4 mM, and above 0.6 mM. With products of this nature, standardization of Ca ion content is required for meaningful comparisons of results between samples. Further investigation is required to assess the possible influence of other serum constituents. AA

2147

Adhikari (AK) and Singhal (OP). **Effect of heat resistant micro-organisms on the fatty acid profile and the organoleptic quality of UHT milk during storage.** *Indian Journal of Dairy Science* 45(5): 1992: 272-277

The initial volatile fatty acid content of UHT milk of 2.2 units increased to 6.2 and 5.1 units after 33 days of storage at 37 and 22°C respectively. The free fatty acids increased from 2.2 μ moles/ml of milk to 7.9 and 8.9 μ moles/ml during storage. Titratable acidity increased to 0.177 and 0.192 at both temp. from initial value of 0.135. The psychrotropic spore counts increased significantly within 16 days of storage at both temp. (0.77 to 2.61 and 2.46). The changes in the flavour score was significant at 1% level of significance ($P < 0.01$) between the periods and at 5% level ($P < 0.05$) of significance between the series, which revealed a fast deterioration of UHT milk due to the production of rancid flavour. SRA

2148

Champagne (CP). **Effect of pencillin on free or immobilized lactococci: Milk acidification and residual antibiotic level.** *Journal of Food Safety* 12(4): 1992: 327-339

Five lactic acid culture were added to milk containing pencillin, and the effect of immobilization on acidification and residual pencillin concn. were determined. Cells of *Lactococcus lactis* subsp. cremoris CRA-1 immobilized in calcium alginate beads were less sensitive to pencillin than free cells, and inhibition occurred later in the fermentation. The lactococci were less sensitive to pencillin when high cell densities were inoculated (10^9 CFU/mL). There was a significant reduction of pencillin (up to 0.3 IU/mL) when milk was inoculated with high populations of *Lac. cremoris* and incubated at 30°C for 6 h. The drop in pencillin concn. was not related to adsorption to the alginate or to the presence of β-lactamase on the cultures. When free cells of *Lac. cremoris*, *Streptoccus salivarius* subsp. *thermophilus* or *Lactobacillus delbrueckii* subsp. *bulgaricus* were added to milk containing antibiotics, and incubated at 4 or 10°C for 48 h, significant reduction of pencillin levels did not occur in the contaminated milk. Milks containing more than 4×10^6 lactococci CFU/mL can give false positive results in the antibiotic disk assay using *Bacillus subtilis*. AA

Milk products

2149

Latha Sabikhi, Kanawjia (SK) and Singh (S). **Recent advances in the application of starter cultures in fermented milk products.** *Beverage and Food World* 19(5): 1992: 37-39

Aspects covered are: direct vat starters, frozen concentrated starters, freeze dried starter concentrates, super concentrates of starter, and other innovations (genetic engineering and dairy starters, plasmid biology, gene transfer systems, potential applications of genetic engineering in dairy starter cultures). BV

Cheese

2150
de la Fuente (MA), Fontecha (J) and Jaurez (M). **Fatty acid composition of the triglyceride and free fatty acid fractions in different cows-, ewes- and goats-milk cheeses.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(2): 1993: 155-158

The fatty acid composition of the triglyceride fraction and the individual and total free fatty acids in different cows-, ewes- and goats-milk cheeses were analysed. The highest total free fatty acid levels were recorded in blue cheeses (Roquefort: 26.0 g/kg: Cabrales: 57.3 g/kg) and in the aged Manchego cheese (32.4 g/kg), followed by those in hard cheeses manufactured using unpurified rennet pastes containing pregastric esterases (Parmesan: 13.7 g/kg: Majorero: 20.8 g/kg). These samples had sharp flavours. The soft cheeses with surface flora presented moderate levels of free fatty acids (Camembert: 5.1 g/kg: de la Vera: 9.9 g/kg). The remaining cheeses considered (Mahon: 8.7 g/kg: Roncal: 8.2 g/kg: Tetilla: 5.8 g/kg: Idiazabal: 5.6 g/kg) also exhibited moderate levels of lipolysis. A comparison of the fatty acid profiles for the two fractions studied yielded higher contents for the short-chain fatty acids in the free fatty acid fraction, except in the blue and goats-milk cheeses. AA

Feta cheese

2151
Litopoulou-Tzanetaki (E), Tzanetakis (N) and Vafopoulou-Mastrojiannaki (A). **Effect of the type of lactic starter in microbiological chemical and sensory characterisitcs of feta cheese.** *Food Microbiology* 10(1): 1993: 31-41

The influence of the type of lactic starter inoculation on chemical and microbiological characteristics of Feta cheese was investigated. Yoghurt (Y) and starters, (A) *Lactococcus lactis* subsp. *lactis* + *Lactobacillus casei* + *Leuconostoc cremoris* (6:2:2). (B) *L. lactis* subsp. *lactis* + *L. casei* + *Enterococcus durans* (6:2:2). (C) *L. lactic* subsp. *lactis* + *L. casei* + *E. durans* + *Leuc. cremoris* (6:2:1:1), were examined. Inoculation with starters B and/or C had a significant ($P < 0.05$) effect on growth of lactococci in fresh cheese. Lower ($P < 0.05$) pH values in starter B (range 4.39 - 4.79) and/or starter C (range 4.45 - 4.74) cheese were recorded until 120 days. Higher acid production or lower pH retarded cheese proteolysis by lactococci early in ripening. However, the increasing with ripening population of *E. durans* in cheese made with starter B or C which produces proteolytic enzymes active at low pH, accumulated higher ($P < 0.05$) amounts of soluble N fractions as ripening progressed in these types of cheese. Levels of PTA-N after 75 days were 3.21, 3.49, 4.08 and 4.89% of the total N in cheese made with starter Y, A, B and C respectively, and contributed to better ($P < 0.05$) flavour, body and texture scores. Thus, mesophilic starters supplemented with *E. durans* might be considered appropriate for Feta cheese production. AA

Mozzarella cheese

2152
Jana (AH) and Upadhyay (KG). **Process standardization for manufacture of mozzarella cheese from homogenized buffalo milk.** *Indian Journal of Dairy Science* 45(5): 1992: 256-260

The modifications required for obtaining mozzarella cheese made from buffalo milk homogenized at 25 to 50 Kg/cm^2 pressure and 60°C temp. were: (a) addition of $CaCl_2$ to cheese milk (at 0.01% w/w), (b) higher cooking temp. (42.5°C), (c) higher draining acidities of whey (0.43 - 0.45% LA) and (d) lower temp. of moulding water and its shorter contact period with the curd (85-90°C/1-3 min) for plasticizing the curd. SRA

2153
Ravi Sundar (M) and Upadhyay (KG). **Influence of whey acidity at draining on the manufacture of buffalo milk mozzarella cheese - Baking, rheological and sensory characteristics.** *Indian Journal of Dairy Science* 45(5): 1992: 261-267

The melting and fat leakage properties of cheese showed a significant decline with increase in whey acidity (WA) at draining. The experimental cheeses were ranked in the order of 0.40 > 0.35 > 0.45 > 0.30 > 0.50% LA for their suitability as a topping on pizza. The WA was found to significantly influence the rheological properties of cheeses. The cheese made using lowest WA at draining had least values for hardness, cohesiveness, chewiness and gumminess. Cheese made by draining at 40% acidity showed max. springiness. Stretchability of curd was impaired at extremes of WA used. Organoleptically 0.40% WA cheese had a superior flavour, body-texture and total score. SRA

Peda

2154

Reddy (CR) and Rajorhia (GS). **Present status of *peda* and *burfi* technology - A review.** *Indian Journal of Dairy Science* 45(5): 1992: 220-225

This review highlights the need for standardising appropriate technology for large scale manufacture of *peda* and *burfi*. Aspects covered include: technology, chemical composition, microbiological quality, method of preparation, packaging and shelf-life of *peda* and *burfi*. 20 references. SRA

Yoghurts

2155

Vedamuthu (ER). **The yoghurt story - past, present and future. Part IX.** *Dairy, Food and Environmental Sanitation* 12(4): 1992: 220-221

Article briefly covers aspects like yoghurt and health, nutritional benefits of yoghurt, yoghurt and intestinal health and other reported health benefits. SRA

Milk proteins

2156

Kalichevsky (MT), Blanshard (JMV) and Tokarczuk (PF). **Effect of water content and sugars on the glass transition of casein and sodium caseinate.** *International Journal of Food Science and Technology* 28(2): 1993: 139-151

The glass transitions of casein and sodium caseinate were studied as a function of water content, using differential scanning calorimetry (DSC), dynamic mechanical thermal analysis (DMTA), a mechanical 3 point bend test, solid state ^{13}C nuclear magentic resonance (NMR) spectroscopy and X-ray diffraction. Glucose and lactose at 10% mass ratio of anhydrous casein had no effect on the glass transition of casein as a function of water content, although at 50% mass ratio there was some increase in glass transition temp. (T_g), i.e. an anti-plasticizing effect, with glucose. In contrast, with 50% fructose in sodium caseinate, there was some plasticizing effect. These results are compared with previous results for amylopectin and gluten-sugar mixtures. AA

2157

Bumberger (E) and Beltiz (H-D). **Bitter taste of enzymic hydrolysis of casein. I. Isolation, structural and sensorial analysis of peptides from tryptic hydrolysates of** β-casein. *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(1): 1993: 14-19

β-Casein A^2 was isolated from milk of homozygopus cow and hydrolysed with trypsin. The hydrolysate was separated by RP-HPLC into 18 peptides, all but one of which could be attributed to the sequence of β-casein on the basis of the amino acid composition. Some peptides overlapped. In total, they represented about 97% of the protein sequence. Only 3 peptides had a bitter taste, namely I^{49}-N^{68} (recognition threshold 1.0 mg/ml, 0.45 mmol/l), I^{49}-K^{97} (1.5 mg/ml, 0.23 mmol/l) and G^{203} - V^{209} (0.175 mg/ml, 0.23 mmol/l). The contribution of the 3 peptides to the overall bitterness of the β-casein hydrolysate (2.67 mg/ml) was about 11, 21 and 60%, respectively. Peptide I^{49}-K^{97} was present in the hydrolysate together with its fragments I^{49}-N^{68} and S^{69}-K^{97}. Remarkably, the smaller and more hydrophobic fragment I^{49}-N^{68} was less bitter than I^{49}-K^{97} on a molar basis, whereas the larger and more hydrophilic fragment S^{69}-K^{97} had a neutral taste. These results show that in the case of larger peptides neither hydrophobicity nor size are responsible alone for bitter potency, but that conformational parameters must be of great importance. Furthermore, it can be concluded that only a part of the structure is responsible for the contact with the receptor. The bitterness of G^{203}-V^{209} is discussed in connection with related synthetic peptides in the literature. AA

MEAT AND POULTRY

Meat

2158

Stapelfeldt (H), Bjorn (H), Skibsted (LH) and Bertelsen (G). **Effect of packaging and storage conditions on development of warmed-overflavour in sliced, cooked meat.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(2): 1993: 131-136

The development of warmed-over flavour (WOF) in a pilot-scale experiment was followed by sensory evaluation and 3 objective methods (thiobarbituric acid reactive substances, relative hexanal content and fluorescent lipid oxidation products) during 14 days of chill storage at 4°C of sliced, cooked lean beef using 3 different packaging conditions: (1) in air in a polyethylene foil (PE); (2) in 99% vacuum in a laminate foil with low oxygen transmission rate (VAC); (3) in a modified atm. (30% CO_2/70% N_2) in a laminate foil with low oxygen transmission rate (MAP). Each of the objective methods correlated well with the sensory evaluation. The sensory quality of the meat packed in PE was clearly inferior to the VAC

and MAP packaed meat, having less meat taste and a perceptible degree of WOF when reheated after only 1 day of storage, increasing to an unacceptable level within 3 days of storage. In contrast, the sensory quality of the VAC and MAP packed meat remained high throughout the storage period. Irrespective of packaging method, no effect of light during the chill storage period on the development of WOF was detected. MAP packaging for precooked beef was tested on a larger scale in a senior citizen food service system. The results showed that in a practical application of MAP the major problem in avoiding WOF was the achievement of a sufficiently low residual oxygen content in the packages. AA

2159

Sahoo (J) and Berwal (J). **Edible or potentially edible offals from meat animals.** *Beverage and Food World* 19(5): 1992: 19-20

Beef

2160

Penney (N), Hagyard (CJ) and Bell (RG). **Extension of shelf-life of chilled sliced roast beef by carbon dioxide packaging.** *International Journal of Food Science and Technology* 28(2): 1993: 181-191

Commercially prepared sliced roast beef in conventional vacuum and oxygen-free saturated carbon dioxide controlled atm. packs was stored at +10°C, +3°C and -1.5°C. The development of foreign flavours during chilled storage resulted in product rejection before the development of putrid flavours characteristic of overt microbial spoilage. The nature of these foreign flavour elements reflected the qualitative composition of the microflora developing on the roast beef slices with 'sharply acidic' associated with *Lactobacillus*-dominated flora and 'sweaty' occurring when these flora contained significant numbers of *Brochothrix thermosphacta*. Product in vacuum packs was rejected on sensory criteria by a trained panel after 3 days, 3 wks and 8 wks for storage at +10°C, +3°C and -1.5°C, respectively. At these temp., in oxygen-free saturated carbon dioxide controlled atm. packaging, rejection levels were not attained after 4 days, 10 wks and 16 wks respectively. AA

2161

Mielche (MM) and Bertelsen (G). **Effects of heat treatment on warmed-over flavour in ground beef during aerobic chill storage.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(1): 1993: 8-13

The effect of heat-treatment conditions (end-point temp. and rate) on warmed-over flavour (WOF) development in ground beef during aerobic chill storage was examined. Quantification of WOF was determined by extraction of thiobarbituric-acid-reactive substances (TBARS), which were correlated with scores obtained by a sensory panel. The effect of end-point temp., heating rate and chill-storage time on TBARS is described by a mathematical model based on first-order kinetics. The model predicts increasing levels of TBARS with increasing end-point temp. (60 - 80°C), increasing heating time and chill-storage time. The model can be used for optimizing processing conditions of heat-treated meat products. AA

Pork

2162

Yen (LC), Sofos (JN) and Schmidt (GR). **Destruction of *Listeria monocytogenes* by heat in ground pork formulated with *Kappa*-carrageenan, sodium lactate and the algin/calcium meat binder.** *Food Microbiology* 9(3): 1992: 223-230

Results indicate that the heating and cooling rates of ground pork (GP) with various additives were very similar; *Kappa*-carrageenan (1%) and sodium lactate (3% of a 60% sol.) did not affect ($P > 0.05$) thermal destruction in uncured GP, but *Kappa*-carrageenan reduced ($P < 0.05$) the protective effect of the cure; and the algin/Ca binder did not affect ($P > 0.05$) the extent of destruction of *L. monocytogenes* by heat in GP. Cooking GP to 62°C over a period of 25 min of heating (from 45°C) time destroyed 5.80-7.35 log cfu g^{-1} of *L. monocytogenes*/g, depending on the formulation. SRA

Products

Ham

2163

Stecchini (ML), Aquili (V), Sarais (I) and Pitotti (A). **Inhibition of *Listeria monocytogenes* by *Lactococcus lactis* subsp. *lactis* isolated from Italian raw ham.** *Journal of Food Safety* 12(4): 1992: 295-302

A total of 168 lactic acid bacteria strains isolated from Italian raw hams were screened for antagonistic activity against *Listeria monocytogenes* by using an agar spot test. Sixteen strains were found to produce inhibition zones on buffered All Purpose Tween (APT) agar at pH 6.5 whereas only one strain was inhibitory to Trypticase soy agar medium which was identified as *Lactococcus lactis* subsp. *lactis* B10. *L. lactis* strains have been demonstrated to produce bacteriocin-like

substances that inhibit the growth of *L. monocytogenes*. The results indicate that the antibacterial compound produced by *L. lactis* B10 is a heat stable protein with a bactericidal mode of action. CSA

Sausages

2164

Hazarika (M) and Biro (G). **Effect of incorporation of blood proteins into sausage.** *Journal of Food Science and Technology (India)* 30(5): 1993: 380-381

Effect of utilization of pig blood proteins, such as plasma, whole blood, plasma protein isolate and globin protein isolate, either individually or in combinations, as ingredients and replacements of sausage mixture in *Lesco* sausage formulation was evaluated. Shrinkage was marginal during 8 days of storage at 4 plus or minus 1°C, protein content was higher than the control and *Escherichia coli*, *Salmonella* and *staphylococcus aureus* were absent in all the samples. Organoleptic qualities were similar to the control, except for the least score for appearance in case of sample with 2% blood. It is evident that incorporation of blood proteins in sausage formulations upto certain levels yields acceptable product from the view point of chemical, microbial and sensory qualities. AA

2165

Roudot (A-C), Duprat (F), Grotte (MG) and O'Lidha (G). **Objective measurement of the visual aspect of dry sausage slices by image analysis.** *Food Structure* 11(4): 1992: 351-359

Images of 20 dry sausage slices and different factors corresponding to aspect structure were analysed. Principal component analysis of data indicated difference between the types of sausages. Good correlation was found with meat part of the slices and visual aspect. SD

Poultry

2166

Sahoo (J) and Tiwari (CM). **Scope for utilization of poultry processing plant waste - a review.** *Poultry Guide* 30(10): 1993: 27-33

Utilization of poultry processing waste such as blood, feather, head, feet, viscera and scald water, washed water and chiller water were studied for prevention of environmental pollution, disease control and protein recovery. Blood components such as haemoglobin, albumin, fibrin, serum, plasma were exploited for commercial use. Poultry offal meal was used to fight against the rising cost of fish meal. Improved techinques in processing, preservation and recycling of poultry byproducts recommended. GS

Chickens

2167

Ammon (J), Mildau (G), Ruge (W) and Delincee (H). **A gas chromatography procedure to detect the radiation processing of chicken meat.** *Deutsche Lebensmittel-Rundschau* 88(2): 1992: 35-37 (De)

A simple GC procedure to detect the radiation processing of chicken is presented. The method is based on the preferential formation of C_{n-1} and C_{n-2} alkanes and alkenes (n being the carbon number of the parent fatty acid), originating from cleavage of the lipids near the ester bond by the radiation treatment. Sample preparation was performed according to common pesticide analysis by fat extraction and separation of the hydrocarbons using florisil chromatography. Separated hydrocarbons are analysed by GC using a flame ionisation detector, and positive results are confirmed by GC - MS. AA

Quails

2168

Renukumari and Mushtari Begum (J). **Studies on *Tandoori* and battered quail.** *Journal of Food Science and Technology (India)* 30(5): 1993: 374-376

The proximate composition, microbial load and acceptability of quail meat from 6, 12 and 18 wk old birds as well as the processed products were determined. *Tandoori* and battered quails were found to be highly acceptable, and no statistically significant (P less than or equal to 0.05) differences were observed with respect to the age of bird and proximate composition. However, slight decrease in moisture with advancement of age from 6 to 18 wks against higher proteins, fat, energy and methionine contents were observed. Age of the bird and method of cooking were directly related to bacterial load. AA

Turkeys

2169

Barbut (S). **Colour measurements for evaluating the pale soft exudative (PSE) occurrence in turkey meat.** *Food Research International* 26(1): 1993: 39-43

The CIELAB colour measuring system was used to measure the colour of turkey breast muscle from young toms, ranging from very light to very dark in colour. Lighter samples exhibited lower pH, lower

gel strength, and higher cooking loss compared to darker samples. The 'L' value (lightness) was significantly correlated with pH of the intact (r = -0.71, P less than or equal to 0.01) and chopped muscle (r = -0.66), cooked gel strength (r = -0.84) and cooking loss (r = 0.87). The results indicate that a type of palé soft and exudative (PSE) condition may exist in turkey breast meat from young toms and that such meat can be identified by a fast and non-destructive colour evaluation. AA

Products

Eggs

Egg powder

2170

Narvaiz (P), Lescano (G) and Kairiyama (E). **Physicochemical and sensory analyses on egg powder irradiated to inactivate *Salmonella* and reduce microbial load.** *Journal of Food Safety* 12(4): 1992: 263-382

Egg powder was treated with 0, 2, 5 and 10 kGy of gamma radiation at 20°C to inactivate *Salmonella* and to stabilize its microbial load. Microbial, physicochemical and sensory detn. were performed during 4 months of storage to select the optimal radiation dose to attain the objective without significantly reducing egg quality. Microbial results show that 2.0 kGy inactivated *Salmonella* and reduced microbial load to levels below those stipulated by the Argentine regulations. Physicochemical detn. of egg powder extracts for peroxide number, spectrophotometric measurements in the visible and UV regions, functional properties on sponge cakes made with egg powder (height, compression-relaxation cycle parameters), foam stability and viscosity showed that gamma-radiation at the dose of 2 kGy, did not cause significant changes in these parameters. Higher radiation doses (5 and 10 kGy) did increase rancidity, pigment loss and protein chain scission. Sensory detn. performed on egg powder, and on cakes manufactured with it, agreed with the physicochemical results. After 110 storage days, 2 kGy was the most suitable of the tested doses. AA

SEAFOODS

2171

Singh (BR) and Kulshrestha (SB). **Isolation of ampicillin sensitive *Aeromonas* from aquatic foods using xylose-lysine-desoxycholate agar and ampicillin-dextrin agar.** *Journal of Food Science and Technology (India)* 30(5): 1993: 359-361

In the present study, 96 fresh water fishes, 37 marine fishes, 13 fresh water prawns, 13 marine shrimps and 26 molluscs have been screened for *Aeromonas* sp. by plating on xylose-lysine-desoxycholate agar (XLDA) and ampicillin-dextrin agar (ADA), after enrichment in alkaline broth. A total of 13 *Aeromonas* strains were isolated with the use of XLDA: 8 from fresh water fishes, 4 from molluscs and one from marine shrimp. Among *Aeromonas* isolates, 11 were *A. sobria*, one each was *A. salmonicida* subsp. *salmonicida* and *A. salmonicida* subsp. *Masoucida*. With the use of ADA, only 7 samples were positive for *Aeromonas*, while the undetected isolates were the ampicillin-sensitive strains. Among the isolates, 5 were sensitive to all the 10 antibiotics tested, while the sensitivity to other antibiotics varied widely. None of the isolates were resistant to nalidixic acid, oxytetracycline, chloramphenicol, norflox and doxycycline. AA

Fish

2172

Karl (H). **Determination of nitrite in smoked fish and other fish products.** *Deutsche Lebensmittel-Rundschau* 88(2): 1992: 41-45 (De)

Changes of the nitrite content in cured and smoked herring and trout fillets during storage at +7°C were studied. The fillets were treated for 15 min with a nitrite containing brine of different concn. Following salt concn. of the brines were chosen: 5, 6, 10, 12 and 20% respectively. No changes in the sodium nitrite content of homogenized samples were found during frozen storage at -30°C, whereas deep frozen fillets showed changes in the nitrite content. During the storage of nitrite containing samples at +7°C in a refrigerator the nitrite content decreased with prolonged storage time. The reduction rate depended on the salt concn. of the brine, the pretreatment of the sample and on the freshness of the fish. The smoking process reduced the original nitrite content to one half. After 8 days at +4°C smoked fresh trout fillets contained only 14% to 31% of the original nitrite content, depending on the concn. of the brine. AA

Cod

2173

Wang (C) and Shelef (LA). **Behaviour of *Listeria monocytogenes* and the spoilage microflora in fresh cod fish treated with lysozyme and EDTA.** *Food Microbiology* 9(3): 1992: 207-213

Raw cod fish fillets were treated before storage by dipping for 10 min at 20°C in: (a) deionized water;

(b) lysozyme (3 mg ml^{-1} H_2O); (c) Na_2EDTA (5-25 mM); and (d) 3 mg ml^{-1} lysozyme and 25 mM EDTA combination. After removal of excess moisture, half of the samples were surface inoculated with *Listeria monocytogenes* strain Scott A (c. 10^3 cells g^{-1}), and the other half was allowed to undergo spoilage by the natural microflora. The fish was stored at 20°C for 3 days or at 5°C for 17 days. *L. monocytogenes* was able to multiply in the fish at both storage temp. However, the fish shelf-life at 5°C was shorter than the lag phase of *Listeria*. Lysozyme supressed listerial growth but had no inhibitory effect against the natural microflora. In contrast, treatment with EDTA (15 or 25 mM) was also effective in supressing growth of the natural microflora and preventing slime formation. AA

Hoki

2174

Ryder (JM), Fletcher (GC), Stec (MG) and Seelye (RJ). **Sensory, microbiological and chemical changes in hoki stored in ice.** *International Journal of Food Science and Technology* 28(2); 1993; 169-180

Sensory, physical, microbiological and chemical analyses were carried out on whole hoki during 21 days of storage in ice. Sensory results show that cooked hoki developed unpleasant odours and flavours after 11 days. Texture changes in cooked fish were minimal. Assessment of the raw fish provided a useful means of predicting quality of cooked fish. The total viable aerobic count on the fish surface first exceeded ICMSF standards after fish had been stored for 11 days in ice. Hypoxanthine and K value were good objective indicators of the freshness of hoki, while measurement of trimethylamine provided a means to monitor the onset of spoilage. AA

Salmon

2175

Hudson (JA) and Mott (SJ). **Growth of *Listeria monocytogenes*, *Aeromonas hydrophila* and *Yersinia enterocolitica* on cold-smoked salmon under refrigeration and mild temperature abuse.** *Food Microbiology* 10(1); 1993; 61-68

Strains of the cold-tolerant bacteria *Listeria monocytogenes*, *Aeromonas hydrophila* and *Yersinia enterocolitica* were inoculated onto samples of cold-smoked salmon and incubated at 5 and 10°C under both aerobic and vacuum-packaged conditions. Enumeration of these organisms was carried out over a time course and data were analysed to give values for the generation and lag times. *L. monocytogenes* grew under all of the conditions tested while *A. hydrophila* grew only at 10°C. *Y. enterocolitica* grew under all conditions tested except aerobic incubation at 5°C. The derived lag and generation times approximated those predicted by response surface models available as published programs or produced in this lab. Contrary to some literature data, it was concluded that *L. monocytogenes* is able to grow significantly on refrigerated vacuum-packaged cold-smoked salmon within the shelf-life of the product. AA

Trout

2176

Nilsson (K) and Ekstrand (B). **The effect of storage on ice and various freezing treatments on enzyme leakage in muscle tissue of rainbow trout (*Oncorhynchus mykiss*).** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(1); 1993; 3-7

In order to study the biochemical changes in fish muscle during ice storage and freezing-thawing processes, the activities of certain marker enzymes in the cell interstital fluid from muscle tissue of rainbow trout were measured. The enzymes analysed were: lysosomal α-glucosidase (E.C.3.2.1.20), β-N-glucosaminidase (E.C.3.2.1.30) and acid phosphatase (E.C.3.1.3.2). The activity in centrifuged tissue fluid (CTF) was compared with the activity in total homogenate. When ice storage was varied between 3 and 14 days, it did not affect enzyme leakage into the CTF significantly. However, there was a distinct difference between fresh fish and fish iced even for only 1 day, which gave increased leakage of marker enzymes. When the ice-stored samples were subject to a freezing-thawing cycle they showed a marked increase in enzyme activity in the press juice. When the freezing process was varied so as to achieve different freezing rates, the slowest freezing rate caused the highest enzyme leakage. AA

PROTEIN FOODS

2177

Vaidehi (MP) and Varalakshmi Rao. **Protein quality of extrusion cooked foods of blended wheat, sorghum, horsegram and sunflower seed cake.** *Beverage and Food World* 19(5); 1992; 22, 24

Extrusion cooked foods based on (A) blend of sorghum (60%), horsegram (30%) and sunflower seed cake (10%) and (B) blend of wheat (60%), horsegram (30%) and sunflower seed cake (10%) were prepared by the extrusion cooking process. The Protein efficiency ratios of the two foods were 1.9 and 2.1, respectively as compared with 2.8 obtained for skim milk powder. The extruded foods

when served with coated spices or sugar were acceptable to general consumers and school children. AA

Infant foods

2178
Livingstone (AS), Feng (JJ) and Malleshi (NG). **Development and nutritional quality evaluation of weaning foods based on malted, popped and roller dried wheat and chickpea.** *International Journal of Food Science and Technology* 28(1): 1993: 35-43

Optimal conditions for malting wheat and chickpea for preparation of weaning foods were standardized and malted flours from 48 h germinated wheat and 24 h germinated chickpea were blended to prepare malted weaning food. Wheat was dry-heat-parboiled (bulgurized), popped in hot sand and blended with popped chickpea flour to prepare popped weaning food. Mildly toasted and debranned wheat and dehusked chickpea flours were mixed and the blend was roller-dried for preparation of roller dried weaning food. The formulations had 60% wheat, 30% chickpea, 5% skim milk powder and 5% sucrose and contained about 16% proteins. The cooked paste viscosity (dietary bulk) of malted food, popped food with malt, and roller dried food with malt was significantly lower than popped and roller dried foods at all comparable slurry concn. The energy density of malted and malt-added food slurries at spoon feeding consistency was 4.2 KJ^{-1}. PER (2.91), biological value (88.3) and true digestibility (87.5) values of malted food were higher than that of the other formulations. AA

2179
Singh (MN) and Mathur (BN). **Reconstitution behaviour of spray-dried infant formula as affected by the type of milk proteins employed for encapsulation of fat.** *Indian Journal of Dairy Science* 45(5): 1992: 251-255

An investigation was carried out to evaluate the influence of varying levels of whey protein and caseins for encapsulation of fat globules on the reconstitution behaviour of spray-dried infant formula. The formula consisted of 20% fat (blend consisting of milk fat, palm oil, groundnut oil and coconut oil), and 12% proteins (with ranging levels of whey proteins:casein ratios). With 100:0; 60:40 and 20:80 levels of whey proteins to caseins, the solubility index was observed to be 0.53; 0.70 and 0.93 respectively. The corresponding values for wettability were 43.32, 57.47 and 68.05 (sec); sinkability (at 6 sec) 12.33, 19.35 and 27.41% transmission; dispersibility 92.77, 89.32 and 86.75%; and flowability 0.80, 0.72 and 0.66 (cot 0), respectively. Thus a distinctive improvement in the reconstitution properties was observed when the proportion of whey protein was higher in comparison with the caseins. This improvement in the reconstitution behaviour may be attributed to the greater hydrophobicity of whey proteins in comparison with caseins when present in the membrane of fat globules consequent to homogenization. AA

Weaning foods

2180
Kotwaliwale (N), Sharma (GP) and Jain (SK). **Storage stability of commercially available weaning foods.** *Journal of Food Science and Technology (India)* 30(5): 1993: 331-334

Analysis of equilibrium moisture content (MC) and a_w at 20, 30, 40 and 50°C for 2 commercial weaning foods showed a range of a_w at all temp., at which major moisture related changes take place. At 50°C the storage stability of these foods is max. at a_w of 0.275 - 0.315 and 0.285 - 0.350 corresponding to equilibrium MC of 0.026 - 0.028 g water/g dry solid and 0.047 - 0.055 g water/g solid. With increase in MC, the moisture binding energy decreases and moisture becomes more free. Isosteric heat decreases with an increase in MC at all 4 temp. SD

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

2181
Seiffert (B), Swaczyna (H) and Schaefer (I). **Simultaneous determination of L-ascrobic acid and D-isoascorbic acid in alcoholic beverages by HPLC.** *Deutsche Lebensmittel-Rundschau* 88(2): 1992: 38-40 (De)

A HPLC-method for the simultaneous separation of L-ascorbic acid and D-isoascrobic acid (erythorbic acid) in alcoholic beverages is described. The clean up procedure is simple and free of loss. Based on a safe and sensitive detn. this method is well suited for routine analysis. The practicableness of the reported method has been manifested by analysing different imported beer and Australian wines. The limit of detn. is about 3 mg/l. AA

Whiskys

2182

Clyne (J), Conner (JM), Paterson (A) and Piggott (JR). **The effect of cask charring on Scotch whisky maturation.** *International Journal of Food Science and Technology* 28(1); 1993; 69-81

The developing chemical composition and aroma attributes of whisky distillates maturing in uncharred and charred American oak casks were compared at intervals over a total maturation period of 3 yrs. Chemcial variables were selected to encompass a wide range considered to contribute to the flavour of maturing distillate. Descriptive sensory analysis was used to generate detailed sensory profiles which were very different for the charred and uncharred cask samples throughout the maturation period. The charred cask samples were rated significantly higher for terms characteristic of mature distillates and significantly lower for terms characteristic of immature distillates. There were significant differences in syringaldehyde, coniferaldehyde, sinapaldehyde, vanillic acid, total phenols and absorbance between the charred and uncharred cask samples but these differences did not completely account for the changes in sensory characteristics. AA

Wines

2183

Enkelmann (R). **Release of trace elements from wine processing aids. Part 5. Perlite.** *Deutsche Lebensmittel-Rundschau* 88(7); 1992; 217-221 (De)

Twelve commercial perlites were investigated on the release of Cu, Zn, Fe, Mg, Cr, Ni, Pb, Cd, As, Al and Snn to both boiling 20% nitric acid and 1% tartaric acid sol. The expected increases in the wine caused by a perlite wash filtration with a dosage of 60 g/hl were calculated. Two perlites releases higher traces of Mn (27 and 53 mg/kg) to tartaric acid sol. All products investigated released increased traces of Fe (74-191 mg/kg; average: 105 mg/g) and especially of Al (197 - 432 mg/kg; average: 298 mg/kg) to the organic acid sol. The increases in the wine caused by these 3 trace elements are in the same magnitude as the limits allowed in the German drinking water conservation legislation. These increases can be considered negligible. The increases in concn. caused by the remaining 8 elements are extremely small and therefore negligible. AA

2184

Suarez (JA) and Agudelo (J). **Characterization of yeast and lactic acid bacterial species in ropy wines.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(2); 1993; 152-154

The microflora in ropy sherry-type wines were identified. The genus *Saccharomyces* were the predominant yeasts (81%), with *S. beticus* prevailing. *Lactobacillus plantarum* was the most frequent bacterial species (33.9%), followed by *Streptococcus diacetilactis* (22%) and *S. lactis* (16.9%). AA

2185

Adsule (RN), Chougule (BA), Kotecha (PM) and Kadam (SS). **Processing of ber. II. Preparation of wines.** *Beverage and Food World* 19(5); 1992; 16-17, 18

An attempt has been made to produce an acceptable quality fermented beverage (wine) from ber fruits. The preliminary studies showed that the wine from ber juice was comparable to that from grape juice except slight astringent taste. The rate of fermentation of ber juice was found to be slower than that of the grape juice. The cost of lab. scale production of ber wine was Rs. 26.75/litre as compared to Rs. 20.00/litre for grape wine. AA

Non-alcoholic beverages

2186

Sethi (V). **Preparation and storage study of lime ginger cocktail at room and low temperature.** *Beverage and Food World* 19(5); 1992; 51-52

Fruit juices

2187

Steinhardt (H) and Petzinna (H). **Automatic analysis of fruit juices.** *Deutsche Lebensmittel-Rundschau* 88(1); 1992; 1-9 (De)

The use of an automatic analyser for determining of 13 different parameters for the analysis of fruit juice (D-glucose, D-fructose, sucrose, D-sorbitol, L-malic acid, L-ascorbic acid, citric acid, D-isocitric acid, acetic acid, ethanol, D- and L-lactic acid and nitrate) is described. Adaptions of enzymatic determinations usually succeeded with negligible modifications of conventional manual detn. methods. For detn. of ascorbic acid and nitrate methods has to be adapted to the equipment and conceptional conditions of the automatic analyser. Linearity, precision and correctness of the methods investigated were very good. In most cases the range of measuring definable for the analyser, with the automatic dilution taken into consideration, could be enlarged by factors between 5 and 20 as compared to manual methods. Comparisons of

methods of all detn. when measuring various samples of fruit juices were judged very good. Automation of fruit juice analysis offers higher precison in results by automation of manual procedures, high sample throughput (up to 300 samples per hr) and also the possibility of efficiently proceeding smaller series of analysis by a fast change of methods, saving reagents. AA

2188
Neradt (F). **Particle-free clear fruit juices.** *Beverage and Food World* 19(5): 1992: 21

Apple juices

2189
Hanger (LY) and Penfield (MP). **Sample/rinse temperature effects on discrimination of sweet and salty differences in a food system.** *Journal of Sensory Studies* 8(1): 1993: 1-11

The ability of panelists to distinguish between samples of apple juice with 2 levels of added sucrose (0.1 and 0.9 g/100 mL) or NaCl (0.05 and 0.14 g/100 mL) was determined using a modified signal detection technique. Samples at various temp. (6, 24 or 50°C) were presented with various rinse conditions. Sometimes a water rinse (6, 24 or 50°C) was presented between samples and sometimes not. R-index values were calculated to predict the ability of panelists to distinguish between samples. No temp. effect was found for sweetness difference tests; however, R-indices showed that salty differences in apple juice were more distinguishable at a sample temp. of 24°C than at 6 or 50°C. Samples temp. had a greater effect than rinse condition (temp. or no rinse) on discrimination between samples differing in NaCl concn. AA

Cider

2190
Singh (RP), Gupta (AK), Bhatia (AK), Harbans Singh and Gaur (GS). **Production of fermented cider from Kashmir apples.** *Beverage and Food World* 19(5): 1992: 48-50

Citrus juices

2191
Widmer (WW), Cancalon (PF) and Nagy (S). **Methods for determining the adulteration of citrus juices.** *Trends in Food Science and Technology* 3(11): 1992: 278-286

Reviews the adulteration of citrus juices by the undeclared addition of sugar and pulp wash, the admixture of juices, the addition of colourants, amino acids and organic acids; and the evaluation of several methods for detecting juice adulteration such as isotopic analysis, site-specific natural isotope fractionation-nuclear magnetic resonance HPLC, trace addition, electrochemical detection, pattern recognition analysis, UV/VIS spectrophotometry and inductively coupled plasma-atomic emission spectroscopy (ICP-AES). 77 references. GS

Orange juices

2192
Barbary (O), Nonaka (R), Delwiche (J), Chan (J) and O'Mahony (M). **Focussed difference testing for the assessment of differences between orange juices made from orange concentrate.** *Journal of Sensory Studies* 8(1): 1993: 43-67

Focused difference testing was applied to 2 orange juices prepared from frozen concentrate. Differences were noted between the juices for darkness of colour, visual appearance of pulpiness, resistance to tongue movement, flavour by mouth, odor, overall taste and taste other than sweetness. The logic and approach of focused difference testing is discussed and contrasted with other sensory analytical techniques. AA

2193
Takahashi (Y), Ohta (H), Yonei (H) and Ifuku (Y). **Microbicidal effect of hydrostatic pressure on Satsuma mandarin juice.** *International Journal of Food Science and Technology* 28(1): 1993: 95-102

Six microbial strains were inoculated into *Satsuma mandarin* (*Citrus unshiu Marc.*) juices and the effects of hydrostatic pressure on their viability were examined. Five microorgamisms were substantially inactivated under 400 MPa at room temp. for 5 min whereas *B. subtilis* survived. The effects achieved by treating at 57°C under 100 MPa for 5 min were comparable to those achieved by treating under 400 MPa at room temp. for 5 min. Pectinesterase was not inactivated even after treating at 600 MPa and 57°C for 5 min. Although the high pressure treatment exerted hardly any effect on juice chemical components, the pulp particle size distribution was slightly changed by treating under 600 MPa at room temp. for 30 min. Pressure treatment had little effect on the volatile flavour components. AA

2194

Zhang (SQ), Fouda (AE) and Matsuura. **Reverse osmosis transport and module analysis for green tea juice concentration.** *Journal of Food Process Engineering* 16(1); 1993; 1-20

Results indicate that the osmotic pressure of the green tea juice (GTJ) concn. is the same as those of fruit juices for a given carbon wt. fraction of the solute. Both solute transport parameter and mass transfer coeff. (MTC) of the GTJ components decrease with an increase in the GTJ concn. with an increase in the operating pressure (OP). An increase in OP reduces the module length required to obtain a given fraction product recovery enormously, particularly when the GTJ concn. is high. An increase in the MTC on the GTJ component on the high pressure side of the membrane also reduces the module length. BV

FATS AND OILS

2195

Bhakare (HA), Khotpal (RR) and Kulkarni (AS). **Lipid composition of *Withania somnifera*, *Phoenix sylvestris* and *Indigolera enualphylla* seeds of Central India.** *Journal of Food Science and Technology (India)* 30(5); 1993; 382-384

Total lipids of *W. somnifera* (Solanaceae), *Ph. sylvestris*) (Palmaceae) and *Ind. enualphylla* (Leguminosaeae) seeds were 14.0, 10.2 and 4.4% and consisted of neutral lipids (87.7 - 90.2%), glycolipids (5.8 - 7.3%) and phospholipids (3.6 - 5.0%). Neutral lipids consisted of triacylglycerols (87.0 - 88.5%) with small amounts of monoacylglycerols, diacylglycerols, free fatty acids, free sterols, sterol esters and hydrocarbons. The glycolipids were predominantly digalactosylglycerol, and acylated-sterylglucoside with small quantities of sterylglucoside and monogalactosylglycerol. The phospholipids (PL) consisted of phosphatidylcholine (PC), phosphatidylethanolamine (PE), phosphatidyl inositol (PI), and cardiolipin (CL) with trace amounts of lysophosphatidylcholine (LPC) and lysophosphatidylethanolamine (LPE). The fatty acid composition of all the lipid material showed the preponderance of palmitic and oleic acids. AA

Oils

2196

Datta (DK) and Chaudhuri (DK). **Edible oils and vanaspati - standardization of flexible packaging material.** *ISI Bulletin* 7(6); 1993; 173-175

Indian scene, standardization (Indian Standards on thermoplastics for food packaging, flexible packs for the packing of vanaspati, flexible packaging materials for packing of refined edible oils), legislation and implementation, problems and constriants are covered. SRA

2197

Uauy-Dagach (R) and Valenzuela (A). **Marine oils as a source of ω-3-fatty acids in the diet: How to optimize the health benefits.** *Progress in Food and Nutrition Science* 16(3); 1992; 199-243

Reviews the importance of ω-3-poly unsaturated fatty acids (PUFA) in health and disease; marine oils as a source of ω-3-fatty acids in the diet; ω-3-fatty acid content, its variability and sources of variability in marine foods; extraction and preservation of ω-3-fatty acids from marine oils; prevention of oxidative rancidity of marine oil fractions; incorporation of ω-3-fatty acids in diets; changes in dietary habits and food consumption pattern; and the modified intake of ω-3-fatty acid for better health. 181 references. GS

Coconut oils

2198

Prasad (PBV). **Effect of additives on liquid-solid transformation in coconut oil.** *Journal of Food Science and Technology (India)* 30(5); 1993; 355-356

The effect of admul, myverol and lecithin on the nucleation in coconut oil was studied through the measurement of nucleation temp.; light scattering method was employed for measurement of nucleation temp. Lecithin and myverol were found to be effective in supressing the nucleation to different levels. The mechanisms involved are discussed. AA

Mustard oils

2199

Sarkar (S) and Bhattacharyya (DK). **Nutrition of interesterified mustard oil.** *Oleagineux* 47(12); 1992; 713-718

The nutritional status of high erucic mustard oil can be significantly improved after randomisation of the oil. The digestibility of mustard oil, animal growth response and food efficiency ratios improve when mustard oil is ingested as a randomised oil and the results become comparable with those of low erucic rapeseed oil. The total lipid content and its components such as triglyceride, total and free cholesterol have been significantly reduced in serum

with dietary randomised mustard oil compared with the original mustard oil. In liver, heart and kidney tissues, the cholesterol level is significantly reduced on randomisation. In serum and all tissues, erucic acid is deposited in insignificant amounts in the case of original mustard oil and randomised oil. AA

SPICES AND CONDIMENTS

2200
Central Food Technological Research Institute (Mysore). **9th Annual Conventional of Indian Association for Cancer Research and National Symposium on Cancer Research. Mysore.14th - 16th March 1990, Spices Board, Cochin.** ix+71: 1990

This article includes the abstracts of papers presented at the symposia such as anti-tumor and anti-carcinogenic activity of spices by Unnikrishnan, M. C. (pp. 28); food and environmental carcinogens by Annapurani, S. (pp. 29); cancer risk and cancer protection associated with various food dishes and food components by Krishnakumar, A.; Balachandran, B.; Balanchru, S.; Sivaswamy, S. N. and Sivaramakrishnan, V. M. (pp. 30-31). CSA

2201
Spices Board (Government of India Cochin). **I Conference on Research and Production of Spices, Bangalore.13th December 1987, Spices Board, Cochin** 1-97; 1988

The papers presented in this conference include the production and productivity of major spices, post-harvest technology and role of spices board by Antony Cherian (pp. 20-33); Development of spices by Velappan, E. (pp. 34-45); Research on cardamon: programmes and prospects by Naidu, R. (pp. 46-49); Research activities and accomplishments by Nair, M. K. (pp. 50-55); Spices development in Karnataka by Guruswamy (pp. 56-58); Pepper development in Kerala by Suseelan, P. (pp. 59-60); Spices and condiments crops in Andhra Pradesh by Rahiman, M. A. (pp. 61-63); Spices production in Tamil Nadu by Mahalingam (pp. 64); Spices export by Mariwala, J. V. (pp. 65-67); Import substitute for cardamom by Reshmi Bhijiani (pp. 67-69); Spices curing and quality of Ashwin J. Shah (pp. 70-73); Taxation and export value added products by George Paul (pp. 74); Spices productivity and development by Ajit Thomas (pp. 75-83); Cumin - bright prospects by Shankerlal Guru (pp. 84-93); Stable price a pre-requisite by Joseph Monipalli (94-95); Large cardamom in Sikkim by Bharat Mani Pradhan (96-97). CSA

Condiments

Papads

2202
Kulkarni (SG), Manan (JK) and Shukla (IC). **Preparation, evaluation and storage of papads made from rice flakes (poha) flour and unripe banana.** *Beverage and Food World* 19(5): 1992: 13-15, 18

Optimum conditions for the preparation of a savoury snack product viz. 'papad' from the rice flake (poha) flour and cooked, unripe banana pulp mix have been standardised. The blend containing 40 parts of poha flour and 60 parts of cooked banana pulp on dry wt. basis yielded papads with acceptable colour, texture, flavour etc, upon deep fat frying. Physico-chemical characteristics of papads have been determined and their sensory quality attributes upon deep fat frying during storage period of 4 months at room temp. have also been evaluated. Sorption isotherm studies revealed that ERH of the product was 68.2% with initial moisture content of 12.0%. Moisture content of 13.9% was found to be critical from the point of quality characteristics of the product. Storage of the product in LDPE and polypropylene (PP) bags indicated that 250 guage LDPE bags were better than 100 guage LDPE bags, providing a shelf-life of about 120 days at ambient condition (25-39°C) and 40-86% RH). Polypropylene bags were still better than 250 guage LDPE bags keeping in view the economy and better transparancy. Sensory quality of fried papads remained quite acceptable upto 4 months storage in respect of colour, texture and flavour under ambient conditions. AA

Essential oils

2203
Bhattacharya (SC), Sen (N) and Sethi (KL). **11th International Congress of Essential Oils, Fragrances and Flavours - Chemistry, Analysis and Structure. New Delhi, India.12th - 16th November, 1989. 81-204-0463-7. Oxford and IB p blishing Co. Pvt. Ltd.** 4,: 1989; V+270

This volume covers the paper presented by Mathew, A. G. on oil and oleoresin from Indian spices (pp. 189-195). CSA

2204
Bhattacharyya (SC), Sen (N) and Sethi (KL). **11th International Congress of essential oils, fragrances and flavours - Biosciences. New Delhi, India.12th - 16th November, 1989. 81-204-0462-9, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.** 3,: 1989; V+133

This vol. includes the paper presented by Krishnan G. Gupta, Renuka Singhal and Meenakshi Gupta on microbial production of diacetyl - a dairy flavour (pp. 113-117). CSA

Orange oils

2205

Braunsdrof (R), Hener (U), Przibilla (G), Piecha (S) and Mosandl (A). **The influence of analytical and technological procedures on the $^{13}C/^{12}C$ isotope ratio of orange oil compounds.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(1): 1993: 24-28 (De)

The influence of chromatographic and technological procedures on the ^{13}C-isotope value of flavour compounds from orange oils was investigated. In order to avoid misinterpretations of isotopic data, quantitative yield during sample clean-up must by ascertained. Ordinary as well as deterpenated orange oils were not influcenced by the technological processing. In the case of special products containing single compounds conc. up to more than 70%, a shift in the $^{13}C/^{12}C$-isotope ratio was detectable. AA

Spices

Turmeric

2206

Goyal (RK) and Korla (BN). **Changes in the quality of turmeric rhizomes during storage.** *Journal of Food Science and Technology (India)* 30(5): 1993: 362-364

Both cured and uncured dried rhizomes for 4 turmeric (*Curcuma longa* L.) cvs were examined for changes in curcumin, essential oils, and oleoresins during 12 months storage at ambient temp. Curcumin content continued to decline upto 10 months, but the change, thereafter, was minor. However, essential oil and oleoresins decreased throughout the storage period. The max. losses in cucurmin, essential oils and oleoresins were 23.4, 27.5 and 24.2%, respectively, after 12 months in cured rhizomes of cv 'EM-321' and uncured rhizomes of cv. 'PCT-2'. AA

2207

Vijaya Kumar (GV), Srinivasa Reddy (K), Seshagiri Rao (M) and Ramavatharam (N). **Soil and plant characters influencing curcumin content of turmeric.** *Indian Cocoa, Arecanut* 15(4): 1992: 102-105

The factors that influence the curcumin accumulation in turmeric rhizomes were studied. Positive correlations were obtained between soil organic carbon, available N and available Mn and the curcumin content of turmeric which eventually suggest the need for application of higher quantities of organic fertilizers and N and Mn fertilizers in order to increase the curcumin content in rhizomes. Of the var. tested, "Duggirala" var. was found to be superior to "Mydukur" var. with respect to the curcumin content, and "Suvarna (P.C.T.8)" contained the highest curcumin content (4.95%). AA

2208

Singh (VB), Swer (B) and Singh (PP). **Influence of nitrogen and potassium on yield and quality of turmeric cv. Lakadong.** *Indian Cocoa, Arecanut* 15(4): 1992: 106-108

Both N and K fertilizers significantly increased the yield of fresh and cured turmeric. The nitrogenous fertilizer could significantly increase the curcumin accumulation in rhizome. At 80 kg N/ha the curcumin content was highest. 80 kg P_2O_5 and 80 kg K_2O per ha were also considered as optimum dose for increasing productivity of turmeric and curcumin content in the rhizome. GS

SENSORY EVALUATION

2209

Yu-Ling Kuo, Panglorn (RM) andNoble (AC). **Temporal patterns of nasal, oral and retronasal perception of citral and vanillin and interaction of these odourants with selected tastants.** *International Journal of Food Science and Technology* 28(2): 1993: 127-137

Perceived intensities of aqueous solutions of 0.01% citral (C) and of 0.14% vanillin were estimated over time when presented nasally (sniffing), retronasally (sipping) and orally (sipping with nose pinched). The onset and decay of nasal perception was very rapid, with max. intensity reached between 4-8s and extinction between 9-15s. The oral response was extremely low, while retronasal intensity reached max. 11-19s after stimulation with a duration ranging from 40 to 120s. Orally, 10 of 19 subjects rated sol. containing C and citric acid (CA) significantly higher than those containing CA alone. Retronasally, citral intensity was enhanced by CA > CA + sucrose (SUC) > SUC > NaCl. Addition of xanthan gum had little effect on perception of citral. Retronasal intensity of vanillin sol. was increased by addition of SUC and depressed by CA and by NaCl. The results demonstrated large differences in perceived intensity and duration via the 3

procedures, significant alteration of oral intensity by added tastants, and marked bimodality of response upon the addition of acid to citral. AA

2210

Bett (KL), Shaffer (GP), Vercellotti (JR), Sanders (TH) and Blankenship (PD). **Reducing the noise contained in descriptive sensory data.** *Journal of Sensory Studies* 8(1): 1993: 13-29

A data reduction protocol was designed to minimize distortion inherent in sensory data. Following removal of nonexistent attributes and treatment levels, extreme value analysis and distribution comparisons combined with graphical representation, facilitated elimination of inconsistent (with respect to overall consensus) panelists. Application of a calibration factor showed super responsive panelists (those with intensity values consistently higher than other panelists) were among the most accurate and thus were retained in spite of their tendency to produce extreme value data. Panelists that consistently produced a narrow variance around the overall mean and rarely produced extreme values were classified as noncomittal and removed. Analysis of variance calls for a split plot design: blocks (sessions) and treatments in main plot, and panelists in subplot. In general, the subplot can be ignored. These methods are suggested for evaluating panelists' training needs; and for eliminating data that distorts the statistical analysis. AA

2211

Tanimura (S) and Mattes (RD). **Relationship between bitter taste sensitivity and consumption of bitter substances.** *Journal of Sensory Studies* 8(1): 1993: 31-41

The effect of consumption of bitter taste substances (caffeine and beer) to bitter taste sensitivity was examined by 19 healthy adults. For individual taste sensitivity, detection thresholds were used on 6 bitter substances (caffeine, iso-α-acids: beer bittering agents, quinine sulphate, L-tryptophan, L-phenylalanine and glycyl-L-phenylalanyl-L-phenylalanine) and 3 non-bitter substances (L-aspartic acid, aspartame and NaCl). Nonusers of caffeine had significantly higher sensitivity (lower threshold) for caffeine compared to moderate and heavy users. Slight consumers of beer had significantly higher sensitivity for iso-α-acids relative to heavy users of beer. Iso-α-acids were not detected in saliva in acute dosing test by using 6 subjects. The correlations between thresholds of 6 bitter substances were calculated. Significant correlations ($p < 0.01$) were noted in 2 cases between caffeine and quinine, and iso-α-acids and L-trypothan. These data suggest the significant relation between individual bitter taste sensitivity and the consumption of caffeine and beer (iso-α-acids). AA

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

2212

Ramachandran (PK), Sukumaran (D), Rao (SS). **Entomology for defence services. Proceedings of the symposium. Gwalior.12th - 14th September, 1990. Defence Research and Development Establishment, Gwalior-474 002.** 1-273; 1991

This symposium includes the abstracts and papers presented on integrated pest management in grain storage system by Doharey, R. B. (pp. 209-218); Deltamethrin as an alternative prophylactic insecticide in grain storage by Babu, C. J. (pp. 226-230); Effect of host seed species on growth and larval energetics of *Callosobruchus maculatus* (F.) by Chandrakantha, J.; Suseela, K. P. and Sethulakshmi, T. (pp. 231-238) and Disinfestation of stored pulses with gamma radiations by Madhu Gill and Pajni, H. R. (pp. 239-243). CSA

BIOCHEMISTRY AND NUTRITION

2213

Anand (AN) and Seshadri (S). **Role of citric acid on iron availability in a model system.** *Journal of Food Science and Technology (India)* 30(5): 1993: 371-373

Role of citric acid in overcoming the effects of polyphenols and calcium phosphate salts on Fe availability in a model system was investigated. Citric acid showed the potential as good as ascorbic acid in counteracting the inhibitory effects of tannate and calcium phosphate on Fe availability. SD

2214

Velev (OD), Nikolov (AD), Denkov (ND), Doxastakis (G), Kiosseoglu (V), Stalidis (G). **Investigation of the mechanisms of stabilization of food emulsions by vegetable proteins.** *Food Hydrocolloids* 7(1): 1993: 55-71

The different microheterogeneous components of a vegetable protein stabilized corn oil in water dispersion, close to the ones used in industrial practice are investigated. Experimental techniques used to uncover the physical mechanisms, controlling the behaviour and stability of the emulsion system include dynamic light scattering for examining the size of the colloid species in the initial aqueous protein sol., zeta-potential measurements of the proteins aggregates and corn oil drops as well as investigation of the surface dilational properties of protein covered oil drops by capillary pressure measurements and of the thickness and stability of thin aqueous films by the microinterferometric technique. The stability and rheological behaviour of batch protein emulsions are briefly examined in order to check that the studied vegetable protein species can serve as effective stabilizers. SD

TOXICOLOGY

2215

Park (DL) and Walker (R). **International symposium and workshop on food contamination, mycotoxins and phycotoxins (cairo, Egypt, 4 - 15 November 1990).** *Food Additives Contamination* 10(1): 1993: 1-156

Following papers were presented at the symposium and workshop. Key elements of food contamination monitoring programmes by Galal-Gorchev, H. (pp 1-4); Assessment of human exposure to chemical contaminants in foods by Conacher, H. B. S. and Mes, J. (pp 5-15); Mycotoxins in review by Pohland, A. E. (pp 17-18); Rationale for regulatory programmes for mycotoxins in human foods and animal feeds by Egmond, H. P. van (pp 29-36). Recent advances in analytical methods for mycotoxins by Gilbert, J. (pp 37-48); Perspectives on mycotoxin decontamination procedures by Park, D. L. (pp 49-50); International coordination and validation of analytical methods by Hortwitz, W. (pp 61-69); Recent methods for detection of seafood toxins: recent immunological methods for ciguatoxin and related polyethers by Hokama, Y. (pp 71-82); Immunological studies using monoclonal antibodies for detection of 4 low dalton marine toxins by Hokama, Y. (pp 83-95); Importance of international cooperation by Canet, C (pp 97-104); Dietary intake levels in food and estimated intake of lead, cadmium, and mercury by Galal-Gorchev, H (pp 115-128); Industrial chemical contamination of foods by Conacher, H. B. S, Page B. D. and Rayan , J. J. (pp 129-143); Diet/toxin interactions by Veno, Y. (pp 145-156). BV

FOOD LAWS AND REGULATIONS

Nil

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